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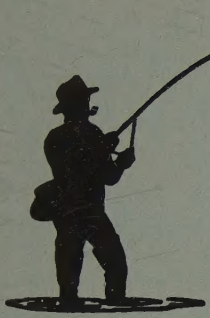

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SPORT FISHERY ABSTRACTS

Vol. 24, No. 1, 1979

DEPARTMENT OF THE INTERIOR
U. S. FISH AND WILDLIFE SERVICE

UNITED STATES DEPARTMENT OF THE INTERIOR
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Robert L. Herbst, Assistant Secretary for Fish and Wildlife and Parks
Fish and Wildlife Service, Lynn A. Greenwalt, Director

SPORT FISHERY ABSTRACTS

Roger Schoumacher, Editor
Terry N. Sexson, Assistant Editor

Editorial Office
U.S. Fish and Wildlife Service
Aylesworth Hall, CSU
Fort Collins, Colorado 80523

Sport Fishery Abstracts is intended to furnish fishery biologists with abstracts of current literature in sport fishery research and management.

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SPORT FISHERY ABSTRACTS

An abstracting service for fishery research and management

Volume 24 Number 1 1979

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AQUATIC PLANTS AND THEIR CONTROL

79-000001 Custer, P. E.; Halverson, F. D.; Malone, J.; Chong, C. V. THE WHITE AMUR AS A BIOLOGICAL CONTROL AGENT OF AQUATIC WEEDS IN THE PANAMA CANAL. Fisheries (Bull. Am. Fish. Soc.) 3 (5): 2-9. Sept.-Oct. 1978. SFA 24(1)

[Eng. Constr. Bur., Panama Canal Co., Canal Zone] The Panama Canal has been plagued with floating and submerged aquatic weeds since its opening. Although more and more money has been spent on herbicides over the years, the weed problem has become more intense. In February 1978 the Panama Canal Company introduced the white amur fish as a biological tool to control the submerged macrophyte hydrilla to Gatun Lake, the large freshwater reservoir through which the majority of the length of the Canal passes. The first shipment of fish (125,000) did not successfully withstand the rapid change from cold Arkansas water temperatures to warm tropical waters, with a resultant loss of about 50 percent. A series of tests was conducted to determine tempering rates of the fish with temperature, dissolved oxygen level, and time as the variables. Various experiments with chemical additives in the tempering water such as salt and quinaldine were also conducted. Based upon the tests, a tempering facility to acclimate a second fish shipment was constructed that circulated chilled lake water through a large fish-holding tank for a period of two days, during which time the temperature was gradually elevated and salt and disinfectants were added to the water. After tempering, the fish were successfully implanted in isolated arms of the Lake, a helicopter being used for transportation.

79-000002 Henderson, S. AN EVALUATION OF THE FILTER FEEDING FISHES, SILVER AND BIGHEAD CARP, FOR WATER QUALITY IMPROVEMENT. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 121-136. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36830. SFA 24(1)

[Ark. Game Fish Comm., Little Rock 72086] With the advent of stricter water quality discharge standards has come the need for alternatives to expensive mechanical wastewater treatment methods. The silver (/Hypophthalmichthys molitrix/) and bighead carp (/Aristichthys nobilis/) filter feeding fishes were utilized in actual field tests to determine their capabilities in controlling excessive plankton blooms and converting nutrients found in wastewaters into usable protein. It was found that the presence of the fish did affect plankton removal and stimulate nutrient uptake. The feeding habits of these fishes make them capable of converting primary production into large amounts of fish flesh without supplemental feeding. The results of this first trial have provided the impetus for further reasearch into this method of wastewater treatment which could be utilized in many instances, ranging from small town sewage treatment plants to lagoons receiving water discharged from fish farming operations.

79-000003 Henderson, S. REVIEW OF THE USE OF THE GRASS CARP IN FISHERIES MANAGEMENT IN ARKANSAS. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 165-166. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish. Allied Aquacult., Auburn Univ. Auburn, AL 36830. SFA 24(1)
[Ark. Game Fish Comm. Little Rock 72205]

79-000004 Miller, G. THE DISTRIBUTION OF AQUATIC WEEDS IN THE FINGER LAKES OF NEW YORK STATE AND RECOMMENDATIONS FOR THEIR CONTROL. Proc. Rochester Acad. Sci. Inc. 13 (1): 25-26. Oct. 1976. Abstract only. SFA 24(1)
[Eisenhower Coll., Seneca Falls, NY]

79-000005 Mitra, E. A REPORT ON COPPER SULPHATE TREATMENTS OF FISHERY PONDS FOR THE CONTROL OF WEEDS 1952-1970. Cent. Inland Fish. Res. Inst. Barrackpore Bull. no. 26. 26p. Nov. 1977. SFA 24(1)
[CIFRI, Barrackpore, West Bengal, India]

79-000006 Theriot, R. F.; Decell, J. L. LARGE-SCALE OPERATIONS MANAGEMENT TEST OF THE USE OF THE WHITE AMUR TO CONTROL AQUATIC PLANTS. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 220-229. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish. Allied Aquacult., Auburn Univ. Auburn, AL 36830. SFA 24(1)
[Waterways Exp. Stn., Vicksburg, MS 39180] The U.S. Army Corps of Engineers, Waterways Experiment Station, Aquatic Plant Research Branch, has initiated a study to determine the feasibility of utilizing the white amur (commonly called the grass carp) as an operational management tool for control of submersed aquatic plants. This study is conducted as a part of the Corps' Aquatic Plant Control Research Program. Feasibility will be determined by (1) evaluating the aquatic ecosystem respsonses to the presence of the white amur, and (2) providing the capability to extrapolate the results of this test to other aquatic ecosystems through the use of a White Amur Stocking Rate Model and an Ecosystem Response Model. The test site, Lake Conway, Florida, is 736 ha and was stocked with approximately 7600 monosex white amur on 9 September 1977. This stocking was effected after completing one year of environmental baseline data collection. Post-stocking data collection is in progress and is scheduled to continue through 1979.

GENERAL FISH CULTURE

79-000007 Bailey, W. M.; Gibson, M. D.; Newton, S. H.; Martin, J. M; Gray, D. L. STATUS OF COMMERCIAL AQUACULTURE IN ARKANSAS IN 1975. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 246-250. 1976[1978]. SFA 24(1)
[Ark. Game Fish Comm., Little Rock] A telephone and personal survey of all known Arkansas fish producers was made during the first quarter of 1976 to determine the extent of change in aquaculture production during the past three years. The survey indicated that although intensive pond production has been reduced by about 4,050 hectares, the economic value since 1972, because of higher prices received for

79-000007 CONTINUED
the products, has increased by 16.8 percent to $24,191,700. Growth in the industry has slowed in recent years due to narrowing profit margins and changes in prices and allotments for other agricultural crops.

79-000008 Bayne, D. R. PROGRESS REPORT ON FISHERIES DEVELOPMENT IN EL SALVADOR. Int. Cent. Aquacult. Res. Dev. Ser. No. 7. 11p. Apr. 1974. SFA 24(1)
[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL]

79-000009 Bruley, G. K.; Horton, J. L. CALIFORNIA TROUT, SALMON, AND WARMWATER FISH PRODUCTION AND COSTS, 1977-78. Calif. Dep. Fish Game Inland Fish. Admin. Rep. No. 78-3. 49p. Oct. 1978. SFA 24(1)
[Calif. Dep. Fish Game, Sacramento]

79-000010 Ghittino, P. PISCICOLTURA INTENSIVA IN GABBIE GALLEGGIANTI: UN'IDEA PER SFRUTTARE ZOOTECNICAMENTA MOLTI LAGHETTI. [INTENSIVE FISH FARMING IN FLOATING CAGES: AN IDEA FOR FISH-HUSBANDRY EXPLOITATION OF MANY SMALL LAKES.] Riv. It. Piscic. Ittiop. 13 (2): 33-34. Apr.-May-June 1978. In Italian with English summ. SFA 24(1)
[Ist. Zooprof. Piemonte, Liguria, Valle d'Aosta, Via Bologna, 148-10154 Torino, Italy] In this preliminary report, it is suggested to develop in Italy the exploitation of small lakes (such as those resulting from quarry) for fish culture in floating cages. As an example, 35 to 50 kg of catfish can be produced in a cage of cm. 168 x 122 x 90. The fish can fed pellets with demand feeders. All environmental parameters must be duly considered, otherwise failures may happen.

79-000011 Hopkins, M. L.; McCoy, E. W. MARKETING OF FISHERIES PRODUCTS BY MUNICIPAL FISHERMAN IN PANQUIL BAY, PHILIPPINES. Int. Cent. Aquacult. Res. Dev. Ser. No. 11. 12p. Nov. 1976. SFA 24(1)
[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL]

79-000012 Hughes, D. G. PROGRESS REPORT ON FISHERIES DEVELOPMENT IN EL SALVADOR, AUG. 1974-MAY 1976. Int. Cent. Aquacult. Res. Dev. Ser. No. 15. 16p. Oct. 1977. SFA 24(1)
[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL]

79-000013 Jensen, J. W. PROGRESS REPORT ON FISHERIES DEVELOPMENT IN NORTHEAST BRAZIL. Int. Cent. Aquacult. Res. Dev. Ser. No. 10. 7p. Jan. 1976. SFA 24(1)
[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL]

79-000014 Lovell, R. T. FISH CULTURE IN POLAND. Int. Cent. Aquacult. Res. Dev. Ser. No. 16. 7p. Nov. 1977. SFA 24(1)
[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL]

79-000015 Lovshin, L. PROGRESS REPORT ON FISHERIES DEVELOPMENT IN NORTHEAST BRAZIL. Int. Cent. Aquacult. Res. Dev. Ser. No. 19. 11p. Apr. 1975. SFA 24(1)
[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL]

79-000016 Lovshin, L. L. PROGRESS REPORT ON FISHERIES DEVELOPMENT IN NORTHEAST BRAZIL, JULY 1, 1975-DEC. 31, 1976. Int. Cent. Aquacult. Res. Dev. Ser. No. 14. 11p. July 1977. SFA 24(1)
[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL]

79-000017 Martin, J. M. RESEARCH BY THE U.S. FISH AND WILDLIFE TO AID FISH FARMERS, WITH EMPHASIS ON THE RESEARCH PROGRAM AT THE FISH FARMING EXPERIMENTAL STATION. In Proc. 1978 Fish Farm. Conf. and Annu. Conv. Catfish Farmers Tex. p. 78-85. 1978. SFA 24(1)
[U.S. FWS, Fish Farm. Exp. Stn., P.O. Box 860, Stuttgart, AR 72160]

79-000018 Matsuda, Y. IMPLICATIONS OF THE JAPANESE EXPERIENCE IN AQUACULTURE DEVELPMENT FOR THIRTY-THREE FOOD-SHORT COUNTRIES. Oceans '78: Fourth Annu. Conf. Mar. Technol. Soc., Washington, DC and Inst. Elec. Electron. Eng., Inc., New York 4: 188-198. 1978. SFA 24(1)
[Woods Hole Oceanogr. Inst., Woods Hole, MA 02543] Aquaculture development in Japan has been limited by the following factors: supply and demand, environmental suitability, technical capability, legality, experience, infrastructure, existence of leadership, economic feasibility and social welfare incentives. Similar limiting factors were examined for thirty-three food-short countries. Fifty-five aquaculture variables were tested using multiple regression analysis combined with Pearson correlation analysis. Results imply that aquaculture development in these Countries are affected by the same limiting factors as in Japan. These findings are the basis for a two-diminsional aquaculture development model which may be helpful in coping with future technology transfer problems.

79-000019 McCoy, E. W. ECONOMIC ANALYSIS OF THE INLAND FISHERIES PROJECT IN EL SALVADOR. Int. Cent. Aquacult. Res. Dev. Ser. No. 16. 15p. Feb. 1974. SFA 24(1)
[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL]

79-000020 Parkman, R. W.; McCoy, E. W. FISH MARKETING IN EL SALVADOR. Int. Cent. Aquacult. Res. Dev. Ser. No. 12. 19p. Jan. 1977. SFA 24(1)
[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL]

79-000021 Parkman, R. W.; McCoy, E. W. MARKETING AS A FACTOR IN FISHCULTURE DEVELOPMENT IN EL SALVADOR. Int. Cent. Aquacult. Res. Dev. Ser. No. 13. 8p. Feb. 1977. SFA 24(1)
[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL]

79-000022 Pettigrew, T.; Henderson, E. B.; Saunders, R. L.; Sochasky, J. B. A REVIEW OF WATER RECONDITIONING RE-USE TECHNOLOGY FOR FISH CULTURE, WITH A SELECTED BIBLIOGRAPHY. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 801. iv + 19p. June 1978. In English with French summ. SFA 24(1)
[Fish. Mar. Serv., Biol. Stn., St. Andrews, NB E0G 2X0, Canada]

79-000023 Schmittou, H. R. AQUACULTURAL SURVEY IN JAPAN. Int. Cent. Aquacult. Res. Dev. Ser. No. 5. 18p. Mar. 1973. SFA 24(1)
[Dep. Fish. Allied Aquacult. Auburn Univ., Auburn, AL]

79-000024 Stein, H.; Bayrle, H. CRYOPRESERVATION OF THE SPERM OF SOME FRESHWATER TELEOSTS. Ann. Biol. Anim. Biochim. Biophys. 18 (4): 1073-1076. 1978. SFA 24(1)
[Dep. Zool. Parasitol. Fishbiol., Tech. Univ. Munich/Weihenstephan, 8050 Freising, West Germany]

79-000025 Street, D. R. AN ECONOMIC ASSESSMENT OF JAMAICA'S FISH CULTURE PROGRAM. Int. Cent. Aquacult. Res. Dev. Ser. No. 19. 8p. Aug. 1978. SFA 24(1)
[Dep. Econ., Auburn Univ., Auburn, AL]

79-000026 Street, D. R. THE SOCIOECONOMIC IMPACT OF FISHERIES PROGRAMS IN EL SALVADOR. Int. Cent. Aquacult. Res. Dev. Ser. No. 17. 14p. Feb. 1978. SFA 24(1)
[Dep. Econ., Auburn Univ., Auburn, AL]

TROUT AND SALMON CULTURE

79-000027 Carpentier, P.; Billard, R. CONSERVATION A COURT TERME DES GAMETES DE SALMONIDES A DES TEMPERATURES VOISINES DE 0 C. [SHORT TERM PRESERVATION OF GAMETES IN SALMONIDS.] Ann. Biol. Anim. Biochim. Biophys. 18 (4): 1083-1088. 1978. In French with English summ. SFA 24(1)
[Lab. Physiol. Poissons, I.N.R.A., 78350 Jouy en Josas, France]

79-000028 Colberg, P. J.; Lingg, A. J. EFFECT OF OZONATION ON MICROBIAL FISH PATHOGENS, AMMONIA, NITRATE, NITRITE, AND BOD IN SIMULATED REUSE HATCHERY WATER. J. Fish. Res. Board Can. 35 (10): 1290-1296. Oct. 1978. In English with French summ. SFA 24(1)
[Dep. Civ. Eng., Stanford Univ., Stanford, CA 94305]

79-000029 Hunter, G. A.; Donaldson, E. M.; Stone, E. T.; Dye, H. M. INDUCED OVULATION OF FEMALE CHINOOK SALMON (/ONCORHYNCHUS TSHAWYTSCHA/) AT A PRODUCTION HATCHERY. Aquaculture 15 (2): 99-112. Oct. 1978. SFA 24(1)
[Fish. Mar. Serv., 160 Marine Dr., West Vancouver, BC V7V 1N6, canada] A simple, low-cost method for inducing ovulation in hatchery-held adult chinook salmon was developed. Use of this method resulted in an increase in the number of eggs collected, by circumventing losses due to prespawning mortality. Three weeks before the peak spawning period, 36 fish were divided into two groups. The control group received two injections of 0.65 percent saline spaced 3 days apart. The test group received a 0.1-mg/kg SG-G100 (salmon

79-000029 CONTINUED
gonadotropin) injection, followed on the third day by a 2.5-mg/kg SG-G100 injection. By Day 8, 73 percent of the treated group and 0 percent of the control group had ovulated. Prespawning mortality accounted for 22 percent of the treated fish and 83.4 percent of the control fish. Treatment resulted in a net gain of 16,000 eggs over the control. The second experiment began 3 days before the peak spawning period. The 32 fish which remained in the stock population were divided into three groups and received two injections 3 days apart. The two treatment groups received either 0.1 mg SG-G100/kg followed by 2.0 mg SG-G100/kg or 0.1 mg SG-G100/kg followed by 50.0 mg salmon pituitary extract (SPE)/kg. The control group was injected with 0.65 percent saline. By Day 8, 73 percent of the SPE group, 82 percent of the SG-G100 group, and 40 percent of the control group had ovulated. Treatment resulted in a net gain of 16,000 eggs for the SG-G100 group and 19,000 eggs for the SPE group over the control.--From abstr.

79-000030 Kinunen, W.; Moring, J. R. ORIGIN AND USE OF OREGON RAINBOW TROUT BROOD STOCKS. Prog. Fish-Cult. 40 (3): 87-89. July 1978. SFA 24(1)
[Oreg. Dep. Fish Wildl., 303 Extension Hall, Oreg. State Univ., Corvallis 97331]

79-000031 Stoss, J.; Buyukhatipoglu, S.; Holtz, W. SHORT-TERM AND CRYOPRESERVATION OF RAINBOW TROUT (/SALMO GAIRDNERI/ RICHARDSON) SPERM. Ann. Biol. Anim. Biochim. Biophys. 18 (4): 1077-1082. 1978. SFA 24(1)
[Inst. Tierzucht Haustiergenet., Albrecht-Thaer-Weg 1, 34 Gottingen, West Germany]

79-000032 Wilson, W. J.; Buck, F. H. STATUS REPORT ON SALMONID CULTURE IN ALASKA. Fisheries (Bull. Am. Fish. Soc.) 3 (5): 10-19. Sept.-Oct. 1978. SFA 24(1)
[Univ. Alaska, Fairbanks]

79-000033 Zell, S. R. CRYOPRESERVATION OF GAMETES AND EMBRYOS OF SALMONID FISHES. Ann. Biol. Anim. Biochim. Biophys. 18 (4): 1089-1099. 1978. SFA 24(1)
[Dep. Zool., Univ. Me., Orono 04473]

OTHER ANADROMOUS SPECIES CULTURE

79-000034 Bonn, E. W.; Bailey, W. M.; Bayless, J. D.; Erickson, K.; Stevens, R. E. GUIDELINES FOR STRIPED BASS CULTURE. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 257-258. 1976[1978]. SFA 24(1)

WARMWATER CULTURE

79-000035 Almazan, G.; Boyd, C. E. PLANKTON PRODUCTION AND TILAPIA YIELD IN PONDS. Aquaculture 15 (1): 75-77. Sept. 1978. SFA 24(1)
[Dep. Fish Allied Aquacult., Auburn Univ., Auburn, AL] Coefficients of determination between net yield of tilapia in ponds (Y) and different measurements of plankton abundance (X) were: phytoplankton numbers ($r^2 = 0.78$), Secchi disk visibility ($r^2 = 0.71$), gross productivity ($r^2 = 0.79$), and chlorophyll /a/ ($r^2 = 0.89$).

79-000036 Anderson, C. E.; Smitherman, R. O. PRODUCTION OF NORMAL MALE AND ANDROGEN SEX-REVERSED /TILAPIA AUREA/ AND /T. NILOTICA/ FED A COMMERCIAL CATFISH DIET IN PONDS. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 34-42. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36830. SFA 24(1)
[Dep. Fish. Allied Aquacult., Agric. Exp. Stn., Auburn Univ., Auburn, AL 36830] In the summer of 1976, /Tilapia aurea/ and /T. nilotica/ fry were sex reversed with 17 alpha-ethynyltestosterone. These and normal fingerlings were over-wintered and then grown to 10-15 cm TL, then normal males were separated from females by examining the urogenital papilla lightly stained with crystal violet. Normal males and sex reversals of both species were stocked as separate treatments in a randomized complete block design at a density of 10,000 fish/ha in 0.04 ha earthen ponds. Fish were fed a commercial floating catfish diet (36 percent protein) daily at a rate of 3 percent of mean body weight. Females occurred within all treatments but not all replicates, due to human error in selecting males and to incomplete sex reversal. Analysis of covariance was used to adjust treatment means for the weight of young fish produced. Adjusted means showed significance (P less than 0.05) for treatments, blocks, and young fish effect. Treatments differed significantly (P less than 0.05) as follows: /T. aurea/ and /T. nilotica/ normal males produced more than their sex reversals; yields of sex reversals of both species were not different. The production of /T. aurea/ normal males was greatest at 2,795 kg/ha and that of /T. nilotica/ sex reversals was lowest at 2,210 kg/ha.

79-000037 Buck, H.; Baur, R. J.; Rose, C. R. POLYCULTURE OF CHINESE CARPS IN PONDS WITH SWINE WASTES. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 144-155. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish. Allied, Aquacult., Auburn Univ., Auburn, AL 36830. SFA 24(1)
[Ill. Nat. Hist. Survey, Kinmundy, IL]

79-000038 Busch, R. L., Jr. EFFECTS OF CLOMIPHENE CITRATE ON THE REPRODUCTIVE CYCLE OF THE CHANNEL CATFISH, /ICTALURUS PUNCTATUS/. Ph.D. dissertation, Auburn Univ. 147p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(3):1060. Sept. 1978. SFA 24(1)
Adult channel catfish separated by sex and held in concrete tanks were fed clomiphene-treated rations from September to December 1974. Treated fish received the drug 5 days a week. Gonadosomatic index (GSI) and histological observations revealed no apparent treatment effects. In a similar experiment Age-Group ii catfish were fed clomiphene between April and June 1975. The drug did not advance

79-000038 CONTINUED
gonadal maturation and may have induced oocyte reabsorption, although environmental and disease stresses could have influenced this condition. Twenty-one pairs of adult catfish were placed into each of two earthen ponds containing spawning boxes. Treated fish received a clomiphene-treated ration from March to June 1976. Clomiphene did not seasonally advance catfish spawning. The drug may have adversely affected spawning success, egg survival, and hatching viability. Forty pairs of adult channel catfish were placed in spawning pens and injected semiweekly with either saline or clomiphene during April and May 1976. Clomiphene did not accelerate gonadal maturation. Spawning success was reduced in fish injected with clomiphene. Seasonally ripe adult channel catfish were paired and held in laboratory facilities during either the 1975 or 1976 spawning seasons (May-June). Clomiphene failed to induce ovulation in female fish when injected at 2, 10, 20, or 40 mg per kilogram of fish body weight at either 24 or 48 hour injection intervals for 10-day periods. Later, some of the clomiphene-injected fish spawned when placed in spawning pens. Injection series of 40 mg clomiphene consistently induced abortion and death in treated fish.

79-000039 Central Inland Fisheries Research Institute FIRST 138
CASE STUDIES OF COMPOSITE FISH CULTURE IN INDIA. Cent. Inland Fish. Res. Inst. Barrackpore Bull. no. 23. SFA 24(1)
[Barrackpore-743101, West Bengal, India]

79-000040 Collis, W. J.; Smitherman, R. O. PRODUCTION OF TILAPIA HYBRIDS WITH CATTLE MANURE OR A COMMERCIAL DIET. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 43-54. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish. Allied Aquacult., Auburn Univ. Auburn, AL 36830. SFA 24(1)
[Dep. Fish. Allied Aquacult., Agric. Exp. Stn., Auburn Univ., Auburn, AL 36830] Two treatments, each with three replications, were stocked with all-male hybrids (female /Tilapia nilotica/ x male /T. hornorum/) at the rate of 10,000 fish/ha on 13 June 1977 in 400 m^2 earthen ponds. Treatment 1 received manure (19 percent crude protein) collected daily from cattle raised in confinement, while treatment 2 received a commercial catfish diet (36 percent crude protein). Fish were fed isonitrogenous amounts of manure or commercial diet daily. After 63 culture days, declining oxygen in the manure treatment forced reduction of the manure inputs from 94.8 kg/ha/day to 81.1 kg/ha/day on a dry matter basis, until the termination of the experiment on 23 September. Over a period of 103 days, adding 28,381 kg/ha of fresh manure (5392 kg/ha dry matter) resulted in an average production of 16.0 kg/ha/day while 3521 kg of commercial diet gave 25.8 kg/ha/day; net yields were 1646 kg/ha and 2663 kg/ha, respectively. Daily weight gain was 1.7 and 2.8 g/day for the manure and commercial diet respectively. Conversion rates based on dry matter inputs/gain and crude protein inputs/gain were 3.3 and 0.62 for the manure treatment, and 1.3 and 0.48 for the commercial diet. Stomach analysis of the fish fed manure showed that manure was used directly as a feed. Organoleptic evaluation showed no significant difference (P greater than 0.05) in taste and texture between fish sampled from treatments receiving manure or commercial diet. Under certain conditons, returns above feed costs for producing hybrid tilapia using cattle manure could be similar to returns from production with a commercial catfish diet.

79-000041 Fram, M. J.; Pagan-Font, F. A. MONOCULTURE YIELD TRIALS OF AN ALL-MALE HYBRID TILAPIA (FEMALE /TILAPIA NILOTICA/ X MALE /T. HORNORUM/) IN SMALL FARM PONDS IN PUERTO RICO. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 55-64. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36830. SFA 24(1)
[Flaming Rainbow Univ., 406 E. Downing St., Tahlequah, OK 74464] The use of an all-male tilapia hybrid in monoculture was tested in two earthen farm ponds near Mayaguez, in western Puerto Rico, from January to June 1976. Hybrid fingerlings were first produced in plastic-lined pools from crosses between female /Tilapia nilotica/ (Linnaeus) and male /T. hornorum/ Trewavas and stocked in the ponds at a rate equivalent to 1,000/ha. A pelleted supplementary feed (30 percent protein) was offered five to seven days per week at rates 2-5 percent of body weight. Fingerlings of both sexes of /T. nilotica/ were similarly stocked and fed in a third pond as a control. Water quality was monitored throughout the 120-day culture periods.

79-000042 Graeber, K. E. THE FISH FARMER AND THE INTERNAL REVENUE SERVICE. In Proc. 1978 Fish Farm. Conf. and Annu. Conv. Catfish Farmers Tex. p. 53-61. 1978. SFA 24(1)
[Tex. Agric. Ext. Serv., College Station 77843]

79-000043 Griffen, W. L.; Lacewell, R. D. ESTIMATED COSTS OF PRODUCING CATFISH IN TEXAS; 1977-1978. In Proc. 1978 Fish Farm. Conf. and Annu. Conv. Catfish Farmers Tex. p. 35-52. 1978. SFA 24(1)
[Dep. Agric. Econ., Tex. A&M Univ., College Station 77843]

79-000044 Jalabert, B.; Goetz, F. W.; Breton, B.; Fostier, A.; Donaldson, E. M. PRECOCIOUS INDUCTION OF OOCYTE MATURATION AND OVULATION IN COHO SALMON, /ONCORHYNCHUS KISUTCH/. J. Fish. Res. Board Can. 35 (11): 1423-1429. Nov. 1978. In English with French summ. SFA 24(1)
[Inst. Nat. Rech. Agron., Lab. Physiol. Poissons, Campus Beaulieu, 35402 Rennes Cedex, France]

79-000045 Jensen, G. L.; Shelton, W. L.; Wilken, L. O. USE OF METHYLTESTOSTERONE SILASTIC IMPLANTS TO CONTROL SEX IN GRASS CARP. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 200-219. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish. Allied Aquacult., Auburn Univ. Auburn, AL 36830. SFA 24(1)
[Coop. Fish. Res. Unit, Auburn Univ., Auburn, AL 36830] We attempted to manipulate sex determination in grass carp (/Ctenopharyngodon idella/) for reproduction control in two experiments using 17 alpha-methyltestosterone (MT) silastic dosage forms implanted intraperitoneally. Implants were inserted with an automatic implant gun. In one experiment, MT-implant, sham-implant, and non-implant treatments were evaluated by stocking 100 each 195-day-old fingerlings averaging 12.6 g into a common 0.03-ha pond in December 1976. After 303 culture days the mean weight of the MT-implanted fish was significantly less than that of fish in the non-implant group. Survival rates for the MT, sham and non-implant treatments were 20, 44 and 55 percent, respectively. Implant retention was 85 percent for the MT group and 54 percent for the sham group. The mean daily diffusion rate for in vivo MT was 20.6 ug/day for the test

79-000045 CONTINUED
period. Histological examination showed that all of the MT-implanted fish had abnormal gonads. Most gonads were smaller than those in the controls, and five fish appeared to have been sterilized. In a second experiment we used 57 MT-implanted and 42 control fish. Three implanted or control fish (309-days old; average weight 40 g) were stocked into each of 33 0.04-ha ponds in April 1977. After 192 days, survival was 100 percent in both the treated and control fish and there was no difference in mean weights. The loss of MT implants was 5 percent; mean MT diffusion rate was 31.0 ug/day. Gonadal sections from MT-treated fish revealed a less destructive effect than that seen in the first experiment (only one fish was apparently sterile), but five fish had a presumptive ovotestis in which testicular tissue predominated in an ovarian-structured gonad. The use of continuous, slow-release silastic implants shows promise for controlling sex, and for a long-term in vivo administration of biochemicals in fish.

79-000046 Jhingran, V. G.; Sehgal, K. L. NOTE ON THE BREEDING, CARE AND MANAGEMENT OF COMMON CARP (/CYPRINUS CARPIO/ LINNAEUS). Cent. Inland Fish. Res. Inst. Barrackpore Misc. Contrib. no. 14. 11p. Mar. 1978. SFA 24(1)
[CIFRI, Barrackpore, West Bengal, India]

79-000047 Jhingran, V. G.; Sharma, B. K. OPERATIONAL RESEARCH PROJECT ON AQUACULTURE IN WEST BENGAL. Cent. Inland Fish. Res. Inst. Barrackpore Bull. no. 27. 6p. Jan. 1978. SFA 24(1)
[CIFRI, Barrackpore, West Bengal, India]

79-000048 Kokhnenko, V. A.; Bezdenezhnykh, V. A.; Gorovaya, S. L. MATURATION OF THE EUROPEAN EEL (/ANGUILLA ANGUILLA/) WHEN ARTIFICIALLY REARED. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (6): 878-883. 1977. SFA 24(1)
[V.A. Bezdenezhnykh, Dep. Zool. Parasitol., Byelorussian Acad. Sci., Minsk, USSR] Sexual products have been obtained for the first time in the USSR from artificially reared European eel (/Anguilla anguilla/) males and females. Information is given on the nature of the maturation of eels under the influence of gonadotrophic hormones. A discription is given of the morphological characters of mature fish, and also of biochemical analyses of the organs and tissues of experimental and control fish.

79-000049 Lauenstein, P. C. INTENSIVE CULTURE OF TILAPIA WITH GEOTHERMALLY HEATED WATER. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 82-85. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish. Allied, Aquacult., Auburn Univ., Auburn, AL 36830. SFA 24(1)
[Fish Dep., Weisbart and Weisbart, Inc., Alamosa, CO 81101] The main features of the tilapia farm in Alamosa, Colorado are a well supplying geothermally heated water at 26°C, circular steel tanks, cement raceways, earthen raceways, and a round earthen pond. The farm requires 252 liters/sec to sustain 50 tons of tilapia (/Tiiapia aurea/) stocked at 20 to 60 kg/m^3/hr. High flow is necessary to maintain the water temperature in raceways above 24°C with ambient temperature as low as -32°C in winter. Important fish production indices include feed conversion of 1.5:1, daily consumption of pelleted feed at 1 to 1.5 percent of body weight, and growth rate of 1 to 2 g/day. Unwanted spawning is not a problem in this flow-through system.

79-000050 Lewis, W. M.; Sheehan, R. J. CHANNEL CATFISH CULTURE: STATE OF THE ART 1976. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 234-238. 1976[1978]. SFA 24(1)

[Dep. Zool., South. Ill. Univ., Carbondale 62901] The perfection of culture techniques for the channel catfish (/Ictalurus punctatus/) has been aided by the commercial demand for fingerlings, by the fact that the catfish is "precocial" by the time the yolk sac is absorbed, is not cannibalistic, and readily utilizes artificial feeds early in life. Several techniques have been developed for producing catfish fingerlings, but the method that appears most acceptable for the production of large numbers of fingerlings is by the pond spawning/trough incubation technique. The principal advantages of this method are that it makes possible a high survival of fingerlings and control of density in the rearing ponds. Where it is desired to mate selected individuals, the aquarium method or the pen method are particularly attractive. There is interest in tank rearing of fingerlings; however, due to the characteristics of the channel catfish, the authors question that this method will have any advantage over the pond method. Most parasitic diseases of catfish fingerlings are well understood, but their control has been adversely affected by legal restrictions on the use of chemotherapeutics. Currently there is a need for further investigation, especially in genetics, economics of feeds, and techniques for maintaining desirable environmental conditions.

79-000051 Liewes, E. W. EELS BRIGHT PROSPECTS FOR FARMING IN EUROPE. Fish Farm. Int. 5 (3): 8-13. Sept. 1978. SFA 24(1)

[Dep. Spec. Anim. Pathol., Fac. Vet. Med., Utrecht Univ., The Netherlands]

79-000052 Maddox, J. J.; Behrends, L. L.; Madewell, C. E.; Pile, R. S. ALGAE-SWINE MANURE SYSTEM FOR PRODUCTION OF SILVER CARP, BIGHEAD CARP, AND TILAPIA. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 109-120. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36830. SFA 24(1)

[TVA, Muscle Shoals, AL] Growth of naturally occurring algae species as a result of swine manure fertilization has been studied. Seasonal changes in species of algae have been observed. A 5-day growth period with manure diluted 340 times and used daily has proven successful to produce plankton in the summertime. Yield trials using this algae were conducted with silver carp (/Hypophthalmichthys molitrix), bighead carp (/Aristichthys nobilis/), and tilapia (/Tilapia nilotica/). Silver carp in monoculture gained 253 percent and had a 79 percent survival in a 72-day study in 1976. A polyculture yield trial (52 days) was conducted in 1977 with all three species to measure their cumulative growth when fed algae exogenously produced and fertilized with swine manure, compared to growth produced by an equivalent amount of manure introduced directly into the fish culture. Fish production was 1.8 times greater when manure was introduced directly into the fish culture. The interaction between feeding rate and stocking rate was tested in a 30-day experiment in water warmed to 25°C during March 1977. Fish grew best when stocked at 6 g per 100 liters and fed algae daily at the rate of 6 percent (dry weight basis) of the initial fish stock weight. Results are discussed with respect to cultural problems encountered and the potential for using such systems in warm waters discharged at power plants.

79-000053 Meryman, C. D. FARM PRODUCTION OF INTRODUCED ORNAMENTAL FISHES IN FLORIDA. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 230-239. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36830. SFA 24(1)

[Fish Doctor Lab., Inc. Tampa, FL 33619] Florida tropical fish farming has been a viable business venture since 1932, and the industry reflects interesting operational characteristics: the absence of mass production techniques, various degrees of specialization and mass merchandising techniques. Average farm size is 10-18 ha and is a family-oriented, autonomous self-styled operation. The largest farms average $600,000 volume sales and the small farms less than $150,000. Average employees on a small (2-10 ha) farm are 2-3, medium (10-16 ha) 8-10, large (16-30 ha) 13 and extra large (over 30 ha) 75-125. Approximately 90 percent of non-native ornamental fish production is concentrated in Florida. Of approximately 252 Florida fish farms, 66 percent are located around Hillsborough County, with the remaining 34 percent on the east coast, from Vero Beach south to Miami. Shipments of tropical fish from Tampa and Miami in 1972 were 750,000 cartons, 200 fish per carton. Tropical fish are the largest class of air freight in Florida, 5-11 million kg annually. Competition is mainly from 111 million imported tropical fish. Over 1000 species make up the saleable list. Of the 194 most common species, 52 percent are Florida produced and 48 percent imported. Most Florida breeder lines date back 10-20 years. Less than 10 percent of the tropical fish produced are new imports. A 1977 survey of 46 comprehensive post mortems of pet fish indicated that diseases were as follows: 59 percent of all fish examined had bacterial diseases, 44 percent ecological, 35 percent protozoan, 28 percent trematode, 13 percent nematode, 2 percent dinoflagellate, 2 percent hirundinea, 2 percent crustacea, 2 percent insecta and 2 percent hereditary. Over 95 percent of new infectious diseases discovered in Florida fish are from infected imports.

79-000054 Murshed, S. M.; Roy, S. N.; Chakraborty, D.; Ranadhir, M.; Jhingran, V. G. POTENTIALS AND PROBLEMS OF COMPOSITE FISH CULTURE TECHNOLOGY IN WEST BENGAL. Cent. Inland Fish. Res. Inst. Barrackpore Bull. no. 25. 11p. Oct. 1977. SFA 24(1)

[CIFRI, Barrackpore, West Bengal, India]

79-000055 Newton, S. H.; Dean, J. C.; Handcock, A. J. LOW INTENSITY POLYCULTURE WITH CHINESE CARPS. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 137-143. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36830. SFA 24(1)

[Dep. Agric., Univ. Ark., Pine Bluff] An experiment was conducted during 1977 at the University of Arkansas at Pine Bluff to investigate the potential of a low-density polyculture fish production system containing Chinese carps (bighead carp, silver carp, and grass carp), plus largemouth bass in combination with channel catfish as compared to a channel catfish monoculture system. The average total net production for the polyculture ponds (1375 kg/ha) was significantly (p less than 0.01) greater than that for the monoculture ponds (712 kg/ha). One-way analysis of variance revealed no significant differences (alpha = 0.05) between net production, feed conversion, survival, average size, and percentage weight increase of channel

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catfish in the monoculture versus the polyculture system. Average survival for bighead carp, silver carp, grass carp, and largemouth bass was 98, 94, 100, and 95 percent, respectively. At harvest, bighead carp, silver carp, grass carp, and largemouth bass net production averaged 133, 481, 130, and 11 kg/ha, respectively.

79-000056 Ray, L. E. PRODUCTION OF TILAPIA IN CATFISH RACEWAYS USING GEOTHERMAL WATER. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 86-89. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36830. SFA 24(1)
[Fish Breeders of Idaho, Inc., Buhl 83316] There exists a market for /Tilapia zillii/ to clean aquatic vegetation from water impoundments. Production technology to supply large numbers of reproductive age /T. zillii/ for early spring stocking was developed. Problems incurred in producing tilapia during the winter including timing, predation, grading, and transportation are discussed. A second potential exists in the form of the food market for tilapia. Initial market testing has been very encouraging.

79-000057 Saha, G. N.; Rao, N. G. S. REPORT ON FISH CULTURE PROSPECTS IN THE COLLAIR LAKE. Cent. Inland Fish. Res. Inst. Barrackpore Surv. Rep. no. 6. 5p. Jan. 1977. SFA 24(1)
[CIFRI, Barrackpore, West Bengal, India]

79-000058 Shelton, W. L.; Hopkins, K. D.; Jensen, G. L. USE OF HORMONES TO PRODUCE MONOSEX TILAPIA FOR AQUACULTURE. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 10-33. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36830. SFA 24(1)
[Ala. Coop. Fish. Res. Unit, Auburn Univ., Auburn 36830] The use of sex hormones to induce functional sex reversal has been demonstrated for several fishes, including some commercially important tilapias. To be practical, however, the procedure must be effective, easy to apply, and economical. Direct treatment of sexually labile tilapia fry with the androgens methyltestosterone and ethynyltestosterone has repeatedly produced all-male populations, but variations in treatment conditions such as stocking density, temperature, and duration, have contributed to inconsistent results. Commercial use of hormone-produced monosex tilapia populations is probably practical if slightly improved or standardized treatment techniques are adopted and if the health considerations for consuming hormone-treated fish are resolved. An alternate consideration is the production of hormone sex-altered tilapia to form a brood stock from which monosex tilapia could be produced. This approach would increase the likelihood of developing a commercially feasible system that would have little concern with potential human health effect.

79-000059 Shireman, J. V.; Colle, D. E.; Rottmann, R. W. MANIPULATION OF TEMPERATURE AND PHOTOPERIOD FOR INDUCING MATURATION IN GRASS CARP. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 156-164. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish Allied Aquacult., Auburn Univ., Auburn, AL 36830. SFA 24(1)

[Sch. For. Resour. Conserv., Univ. Fla., Gainesville 32611] A closed system composed of one 1.83 m circular insulated tank, biological filter, and cooling tank, was designed to hold grass carp brood fish in a controlled environment. Ovulation was induced with temperature and photoperiod manipulation in two consecutive years. Viable eggs and sperm were obtained from fish held in these systems. Replicated experiments designed to determine optimal photoperiod and temperature regimes necessary for early maturation are currently in progress. This method appears to be an economical way to induce early spawning in grass carp.

79-000060 Snow, J. R. INCREASING THE YIELD OF CHANNEL CATFISH REARING PONDS BY PERIODIC DIVISION OF THE STOCK. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 239-245. 1976[1978]. SFA 24(1)

[Auburn Univ. Agric. Exp. Stn., Auburn, AL 36830] Stocking of small fingerling catfish into rearing ponds at a density to give the optimum number and weight for harvest at edible size gives a low gain per acre per day during the first half of the grow-out period. Use of a much heavier stocking rate initially, with periodic division or splitting of the stock shows promise of significantly increasing the gain per acre per day. Use of two divisions gave a gain per acre per day of about 25 pounds for the first phase and 10 pounds for the second. A hypothetical example is presented which should make a gain of 12 pounds per acre per day possible over a 360 day calendar year period under central Alabama conditions. Several possible ways the growing stock could be divided are listed.

79-000061 Stickney, R. R.; Chamberlain, S. K. EFFECTS OF DENSITY ON THE GROWTH OF /TILAPIA AUREA/. In Proc. 1978 Fish Farm. Conf. and Annu. Conv. Catfish Farmers Tex. p. 86-94. 1978. SFA 24(1)

[Dep. Wildl. Fish. Sci., Tex. A&M Univ., College Station 77843]

79-000062 Stickney, R. R.; Hesby, J. H. TILAPIA PRODUCTION IN PONDS RECEIVING SWINE WASTES. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 90-101. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36830. SFA 24(1)

[Dep. Wildl. Fish. Sci., Tex. A&M Univ., College Station 77843] The emphasis of aquacultural research on tilapia in Texas has been focused on /Tilapia aurea/. Preliminary investigations have been conducted to determine the protein requirements of this species, with most of the research centered on the production of /T. aurea/ in ponds receiving swine and poultry wastes. The tolerance of /T. aurea/ to poor water quality allows this species to survive under conditons which might be lethal to more traditional United States aquaculture fishes. Rapid growth will occur in /T. aurea/ reared in ponds receiving input directly from swine or from primary settling ponds. Fish produced in waste lagoons can be utilized as human food or to supplement the diets of livestock.

79-000063 Suffern, J. S.; Adams, S. M.; Blaylock, B. G.; Coutant, C. C.; Guthrie, C. A. GROWTH OF MONOSEX HYBRID TILAPIA IN THE LABORATORY AND SEWAGE OXIDATION PONDS. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 65-81. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36830. SFA 24(1)

[Environ. Sci. Div., Oak Ridge Natl. Lab., Oak Ridge, TN 37830.] Studies were conducted to evaluate the potential of monosex hybrid tilapia (female /T. mossambica/ x male /T. hornorum/) in waste-heat polyculture systems. The optimum growth temperature for this hybrid was found to be 32°C in laboratory experiments. Experiments in sewage pond cage culture in the temperature range of 23-33°C at stocking densities of approximately 53 fish/m^3 were also conducted. At fish sizes between 5 and 12 cm TL, estimated annual production is approximately 50,000 kg/ha/yr (50,000 lb/acre/yr). Fish grown in the sewage oxidation ponds grew significantly faster than fish fed trout chow at optimum temperature in the laboratory, even though temperatures in the sewage ponds averaged below the optimum growth temperature. Techniques to accelerate growth rates are being explored. Exposure to gamma radiation (500 rads), known to cause significant increases in channel catfish growth rate, was found to have a similar effect on tilapia. After a 20-week growth period, exposed fish averaged 20 percent heavier than controls.

79-000064 Tal, S.; Ziv, I. CULTURE OF EXOTIC FISHES IN ISRAEL. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 1-9. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36830. SFA 24(1)

[Fish. Dep., Minist. Agric., P.O. Box 21170, Tel-Aviv 62263, Israel] The introduction of several species into the fish culture system of Israel is discussed. These include /Tilapia nilotica/ from Africa, and the Chinese fishes, silver carp (/Hypopthalmichthys molitrix/), grass carp (/Ctenopharyngodon idella/), and bighead carp (/Aristichthys nobilis/). Hybridization of /T. nilotica/ with the native /T. aurea/, and the use of tilapias in monoculture and in polyculture with carp (/Cyprinus carpio/), the chinese carps, and mullet (/Mugilidae/) are described.

MARICULTURE

79-000065 Ager, L. A.; Hammond, D. E.; Ware, F. ARTIFICIAL SPAWNING OF SNOOK. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 158-166. 1976[1978]. SFA 24(1)

[Fla. Game Fresh Water Fish Comm., Okeechobee 33472] Satisfactory procedures were developed for the artificial propagation of snook, /Centropomus undecimalis/, as were methods for capture, care, transport, and handling of the broodfish. Milt stored at 40° F. up to 12 hours was satisfactory for fertilization. Fecundity was determined to be approximately 45,000 eggs per pounds of body weight. Fertile eggs were bouyant at salinities greater than 20°/(00). Lack of agitation during the first 6 hours of incubation proved critical for consistent embryo development. Hatching occurred between 24 and 30 hours after fertilization at incubation temperatures between 82° and 87° F. Fry culture efforts were limited to intensive culture

79-000065 CONTINUED
techniques in the laboratory.

79-000066 Arnold, C. R.; Lasswell, J. L.; Bailey, W. H.; Williams, T. D.; Fable, W. A., Jr. METHODS AND TECHNIQUES FOR SPAWNING AND REARING SPOTTED SEATROUT IN THE LABORATORY. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 167-178. 1976[1978]. SFA 24(1)
[NMFS, Port Aransas Lab., P.O. Box 1208, Port Aransas, TX 78373] Spotted seatrout were maintained in an indoor tank (6 x 3.3 x 1.5m). Temperature and light were adjusted to simulate the seasons. When the light regime equaled 15 hr light and 9 hr dark and the temperature was 26 C, the spotted seatrout began to spawn. They continued to spawn during each of 13 consecutive months for a total of 82 spawns. Eggs were collected from the filter box with glass beakers and placed in 74-liter aquaria. The eggs hatched after 18 hr. Newly hatched seatrout were fed rotifers (/Brachionis plicatilis/) and brine shrimp (/Artemia/ sp.). Descriptions and illustrations are provided of the tanks, aquaria, lighting equipment, collecting gear, and plumbing. Procedures and methods for collecting adults, for inducing them to spawn, for collecting the eggs, for rearing the larvae, and for growing food for the larvae are described in detail.

79-000067 Fuchs, J. INFLUENCE DE LA PHOTOPERIODE SUR LA CROISSANCE ET LA SURVIE DE LA LARVE ET DU JUVENILE DE SOLE (/SOLEA SOLEA/) EN ELEVAGE. [EFFECT OF PHOTOPERIOD ON GROWTH AND SURVIVAL DURING REARING OF LARVAE AND JUVENILES OF SOLE (/SOLEA SOLEA/).] Aquaculture 15 (1): 63-74. Sept. 1978. In French with English summ. SFA 24(1)
[Cent. Oceanol. Bretagne, B.P. 337, 29273 Brest Cedex, France] The effect of photoperiod on survival and growth of cultured young soles (/Solea solea/) was investigated from hatching to the age of three months, at 18°C. Two experiments were performed, comparing days with 12, 18, and 24 h light. The fishes were reared in 60 l tanks, conical ones before metamorphosis, square ones with sandy bottom from metamorphosis to the age of three months. They were fed on live food organisms for 1 month, on frozen flesh of the bivalve /Laevicardium crassum/ for the two other ones. During the larval Period, no significant difference was recorded in the survival rate but a better growth was obtained with 18 and 24 h light, suggesting a predominant diurnal feeding. From metamorphosis to the age of three months (mean weight: 1 g) no significant effect of the photoperiod on the survival and growth of the juveniles could be demonstrated.

79-000068 Hassler, W. W.; Rainville, R. P. TECHNIQUES FOR HATCHING AND REARING COBIA, /RACHYCENTRON CANADUM/, THROUGH LARVAL AND JUVENILE STAGES. Univ. N.C. Sea Grant Prog. Publ. UNC-SG-75-30. 26p. Dec. 1975. SFA 24(1)
[235 Burlington Lab., N.C. State Univ., Raleigh 27607]

79-000069 Hassler, W. W.; Rainville, R. P. TECHNIQUES FOR HATCHING AND REARING DOLPHIN, /CORYPHAENA HIPPURUS/, THROUGH LARVAE AND JUVENILE STAGES. Univ. N.C. Sea Grant Prog. Publ. UNC-SG-75-31. 17p. Dec. 1975. SFA 24(1)
[1235 Burlington Lab., N.C. State Univ., Raleigh 27607]

79-000070 Heard, W. R.; Salter, F. H. SIMPLE VENTURI DEVICE FOR MIXING FRESHWATER AND SEAWATER IN AN ESTUARINE CULTURE SYSTEM. Prog. Fish-Cult. 40 (3): 101-103. July 1978. SFA 24(1)
[NMFS, Auke Bay, AK 99821]

79-000071 Huguenin, J. E.; Ansuini, F. J. A REVIEW OF THE TECHNOLOGY AND ECONOMICS OF MARINE FISH CAGE SYSTEMS. Aquaculture 15 (2): 151-170. Oct. 1978. SFA 24(1)
[Groton BioIndustries, P.O. Box 133, Woods Hole, MA 02543] Current interest in large-scale commercial culturing of marine fish in cages has prompted a detailed look at the technical and economic aspects of this emerging industry. The state-of-the-art is defined, design and operating problems are discussed and areas needing technological improvements are identified.

79-000072 Kumai, H.; Nakamura, M. SPAWNING OF THE SILVER WHITING /SILLAGO SIHAMA/ (FORSSKAL) CULTIVATED IN THE LABORATORY. Bull. Jpn. Soc. Sci. Fish. 44 (9): 1055. Sept. 1978. SFA 24(1)
[Fish. Lab., Kinki Univ., Uragami, Wakayama 649-51, Japan]

79-000073 Oceanic Institute THE GREY MULLET (/MUGIL CEPHALUS/ L.): INDUCED BREEDING AND LARVAL REARING RESEARCH. 1972-73 VOLUME II. Ocean. Inst. Rep. No. OI-73-128. v + 104p. 1 Sept. 1973. SFA 24(1)
[Waimanalo, HI 96795] A collection of 7 papers.--RS

79-000074 Parker, N. C.; Strawn, K.; Kaehler, T. HYDROLOGICAL PARAMETERS AND GAS BUBBLE DISEASE IN A MARICULTURE POND AND FLOW-THROUGH AQUARIA RECEIVING HEATED EFFLUENT. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 179-191. 1976[1978]. SFA 24(1)
[U.S. FWS, Southeast. Fish Cult. Lab., Marion, AL 36756] Total dissolved gas, dissolved oxygen, dissolved nitrogen, pH, conductivity, temperature, and turbidity were monitored to determine diel and annual changes in a mariculture pond and in aquaria supplied with water discharged from a power plant. The diel and annual ranges of all hydrological parameters were greater in the pond than in aquaria. Diel patterns were similar in both cases but the amplitude was attenuated in the laboratory aquaria. Gas bubble disease (GBD) developed in 17 marine and estuarine fishes and in grass shrimps in the laboratory. GBD was more prevalent in aquaria at higher temperatures than in aquaria at lower temperatures. The disease occurred only in the winter months and was simultaneously found in fish in aquaria and in fish cultured in cages in the discharge canal. GBD was attributed to nitrogen supersaturation produced as water passed through the power plant and also to pump cavitation and to changing fish from water of high saturation to water of low saturation during cleaning of tanks. Degassing technology must be applied to heated effluents and aquaculture facilities incorporated into power plant design if their full potential for aquaculture is to be realized.

79-000075 Rothbard, S. SECONDARY NURSING OF THE RED SEA BREAM, /CHRYSOPHRYS MAJOR/ (TEMMINCK & SCHLEGEL), IN AN EARTH POND. Aquaculture 15 (1): 53-62. Sept. 1978. SFA 24(1)
[Fish Aquacult. Res. Stn., Dor, D.N. Hof-Hacarmel, Israel] Fry of the red sea bream, /Chrysophrys major/ (Temminck & Schlegel), were nursed in an earthen pond for 40 days. Samples of 50 fry were weighed and measured individually at 10-day intervals. Growth of fry was faster in this pond than in the open seas, presumably as a result of the higher temperature in the pond. The high mortality during the first and the second 10-day periods was probably caused by handling and incorrect feeding. The frequency distribution of weight was skewed to the right for all samples, with the highest coefficient of skewness at the first and last weighings.

FEEDS, FEEDING AND NUTRITION

79-000076 Anderson, R. J. PROTEIN REQUIREMENTS OF SMALLMOUTH BASS AND LARGEMOUTH BASS. Ph.D. dissertation, Colo. State Univ. 136p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(5):2032. Nov. 1978. SFA 24(1)

79-000077 Beyerle, G. B. HATCHERY-REARED FINGERLING WALLEYES UNHARMED BY DIET CHANGE FROM PELLETS TO SPINY-RAYED PREY FISH. Prog. Fish-Cult. 40 (3): 93. July 1978. SFA 24(1)
[Mich. Dep. Nat. Resour., Wolf Lake State Fish Hatchery, Route 1, Mattawan 49071]

79-000078 Ghittino, P. RICERCHE PRELIMINARI SULL'AGGIUNTA DI PROTEASI (HKL-614) NELLA FORMULAZIONE DI PELLETS PER TROTA. [A PRELIMINARY RESEARCH ON THE ADDITION OF PROTEASE ENZYME (HKL-614) IN TROUT PELLET FORMULATIONS.] Riv. It. Piscic. Ittiop. 13 (2): 37-39. Apr.-May-June 1978. In Italian with English summ. SFA 24(1)
[Ist. Zooprof. Piemonte, Liguria, Valle d'Aosta, Via Bologna, 148-10154 Torino, Italy] A preliminary research on the addition of protease enzyme (HKL-614, Henkel KGaA, Postfach 1100, D-4000 Dusseldorf 1) to experimental trout pellets, which were high or low in vegetable proteins, has been undertaken. The research was conducted on 3819 rainbow trout fingerlings (SPF for VHS, 9-12 cm, 25.15 g) separated in 12 groups kept in small raceways fed spring water 10°C. According to the final weight, after 3 months of experiment, no favorable growth effect has been found for the pellets high in vegetable protein (soybean, 30 percent) and added with 0.3-0.4 percent HKL-614 enzyme. A tendency of improving the conversion factor has been seen in pellets not high in soybean and added with the enzyme. Further researches are warranted for suggesting the employ of the product in fish feeding.

79-000079 Ghittino, P. THE STATUS OF FISH NUTRITION RESEARCH IN ITALY. Riv. It. Piscic. Ittiop. 13 (3): 65. July-Aug.-Sept. 1978. In English and Italian. SFA 24(1)
[Via Bologna, 148-10154 Torino, Italy]

79-000080 Hardy, R. W. EFFECTS OF DIETARY PROTEIN AND PYRIDOXINE LEVELS ON GROWTH AND DISEASE RESISTANCE OF CHINOOK SALMON. Ph.D. dissertation, Univ. Wash. 92p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(5):2027. Nov. 1978. SFA 24(1)

79-000081 Lim, C. DIETARY ASCORBIC ACID (VITAMIN C) REQUIREMENTS OF CHANNEL CATFISH IN PONDS AND IN A CONTROLLED ENVIRONMENT. Ph.D. dissertation, Auburn Univ. 87p. 1977. From Diss. Abstr. Int. B Sci. Eng. 38(2):432. Aug. 1977. SFA 24(1)

79-000082 Lovell, R. T. DIETARY PHOSPHORUS REQUIREMENT OF CHANNEL CATFISH (/ICTALURUS PUNCTATUS/). Trans. Am. Fish. Soc. 107 (4): 617-621. July 1978. SFA 24(1)
[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36830]

79-000083 Ogino, C.; Takeda, H. [REQUIREMENTS OF RAINBOW TROUT FOR DIETARY CALCIUM AND PHOSPHORUS.] Bull. Jpn. Soc. Sci. Fish. 44 (9): 1019-1022. Sept. 1978. In Japanese with English summ. SFA 24(1)
[Lab. Fish. Nutr., Tokyo Univ. Fish., Konan 4, Minato-ku, Tokyo 108, Japan]

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[Lab. Fish. Nutr., Tokyo Univ. Fish., Konan 4, Minato-ku, Tokyo 108, Japan]

79-000085 Reinitz, G. L.; Orme, L. E.; Lemm, C. A.; Hitzel, F. N. INFLUENCE OF VARING LIPID CONCENTRATIONS WITH TWO PROTEIN CONCENTRATIONS IN DIETS FOR RAINBOW TROUT (/SALMO GAIRDNERI/). Trans. Am. Fish. Soc. 107 (5): 751-754. Sept. 1978. SFA 24(1)
[U.S. FWS, Rt. 1, Box 205, Spearfish, SD 57783]

79-000086 Rickards, W. L.; Foster, J. E.; Jones, W. R. A FEEDING TRAY FOR USE IN EEL FARMING. Univ. N.C. Sea Grant Publ. UNC-SG-78-04. 11p. Apr. 1978. SFA 24(1)
[105 - 1911 Bldg., N.C. State Univ., Raleigh 27650]

79-000087 Sato, M.; Yoshinaka, R.; Ideda, S. DIETARY ASCORBIC ASCID REQUIRMENT OF RAINBOW TROUT FOR GROWTH AND COLLAGEN FORMATION. Bull. Jpn. Soc. Sci. Fish. 44 (9): 1029-1035. Sept. 1978. SFA 24(1)
[Dep. Fish., Fac. Agric., Kyoto Univ. Kyoto, Japan]

79-000088 Takeuchi, T.; Watanabe, T.; Ogino, C. [USE OF HYDROGENATED FISH OIL AND BEEF TALLOW AS A DIETARY ENERGY SOURCE FOR CARP AND RAINBOW TROUT.] Bull. Jpn. Soc. Sci. Fish. 44 (8): 875-881. Aug. 1978. In Japanese with English summ. SFA 24(1)
[Lab. Fish. Nutr., Tokyo Univ. Fish., Konan, Minato-ku, Tokyo, Japan]

79-000089 Takeuchi, T.; Watanabe, T. [GROWTH-ENHANCING EFFECT OF CUTTLEFISH LIVER OIL AND SHORT-NECKED CLAM OIL ON RAINBOW TROUT AND THEIR EFFECTIVE COMPONENTS.] Bull. Jpn. Soc. Sci. Fish. 44 (7): 733-738. July 1978. In Japanese with English summ. SFA 24(1)
[Lab. Fish. Nutr., Tokyo Univ. Fish., Konan 4, Minato-ku, Tokyo, Japan]

79-000090 Takeuchi, T.; Yokoyama, M.; Watanabe, T.; Ogino, C. [OPTIMUM RATIO OF DIETARY ENERGY TO PROTEIN FOR RAINBOW TROUT.] Bull. Jpn. Soc. Sci. Fish. 44 (7): 729-732. July 1978. In Japanese with English summ. SFA 24(1)
[Lab. Fish Nutr., Tokyo Univ. Fish., Konan 4, Minato-ku, Tokyo, Japan]

79-000091 Valfre, F.; Bosi, G.; Bellezza, P.; Olivieri, O.; Moca, S. ULTERIORI DATA SULLA PRESENZA DI N-PARAFFINE IN COMUNI MANGIMI DEL COMMERCIO. [FURTHER RESULTS ON N-PARAFFIN OCCURRENCE IN COMMERCIAL ANIMAL FEEDS.] Riv. It. Piscic. Ittiop. 13 (3): 69-71. July-Aug.-Sept. 1978. In Italian with English summ. SFA 24(1)
[Via S. Constanzo, 4-06100 Perugia, Italy] the authors analyzed various ingredients and complete feeds for turkeys, swine, rabbits and cattle for establishing their n-paraffins storage levels. It may be significant that high levels of n-paraffins (up to 41 ppm) have been found in commercial feeds for trout fingerlings.

79-000092 Watanabe, T.; Arakawa, T.; Kitajima, C.; Fukusho, K.; Fujita, S. [PROXIMATE AND MINERAL COMPOSITIONS OF LIVING FEEDS USED IN SEED PRODUCTION OF FISH.] Bull. Jpn. Soc. Sci. Fish. 44 (9): 979-984. Sept. 1978. In Japenese with English summ. SFA 24(1)
[Lab. Fish. Nutr., Tokyo Univ. Fish., Konan 4, Minato-ku, Tokyo, Japan]

79-000093 Watanabe, T. [NUTRITIONAL EVALUATION OF PROTEINS OF LIVING FEEDS USED IN SEED PRODUCTION OF FISH.] Bull. Jpn. Soc. Sci. Fish. 44 (9): 985-988. Sept. 1978. In Japanese with English summ. SFA 24(1)
[Lab. Fish. Nutr., Tokyo Univ. Fish., Konan 4, Minato-ku, Tokyo, Japan]

79-000094 Werder, U.; Saint-Paul, U. FEEDING TRIALS WITH HERBIVOROUS AND OMNIVOROUS AMAZONIAN FISHES. Aquaculture 15 (2): 175-177. Oct. 1978. SFA 24(1)
[INPA, Caixa Postal 478, 69.000 Manaus/Am, Brazil] Fish of three species were fed on diets containing 30 percent total protein of which 0-95.5 percent was animal (fish meal) protein. /Mylossoma/ sp. and /Semaprochilodus theraponura/ showed the best growth rates (27 and 43.5 percent weight gain in 23 days) when only 25 percent of the protein was of animal origin, and /Colossoma macropomum/ grew best (28.1 percent weight gain in 23 days) on a diet with no animal protein. /Brycon melanopterum/, an omnivore, grew well (50.5 percent weight gain in 29 days) on a diet containing 35 percent total protein of which 50 percent was of animal origin.

79-000095 Williams, S. F.; Caldwell, R. S. GROWTH, FOOD CONVERSION AND SURVIVAL OF 0-GROUP ENGLISH SOLE (/PAROPHRYS VETULUS/ GIRARD) AT FIVE TEMPERATURES AND FIVE RATIONS. Aquaculture 15 (2): 129-139. Oct. 1978. SFA 24(1)

[Dep. Biol. Sci., St. Cloud Univ., St. Cloud, MN 56301] Young sole, fed a diet of Oregon Moist Pellets, were exposed to constant temperature-ration combinations between 9.5 and 21°C and between 0 and 16 percent rations (dry weight basis) for a 12-week experimental period. The juvenile sole, initially 4-6 g, grew at a rate of up to 0.95 percent per day at the most favorable temperature-ration combination, 9.5°C and 16 percent ration. Highest food conversion efficiency, 10.5 percent, was observed at the temperature-ration combination of 9.5°C and 8 percent ration. At 21°C, young sole lost weight at the ration levels fed. Based on growth rate, survival and food conversion efficiencies observed during the experiments and the temperatures to which the young sole are exposed in nature, the temperature at which greatest growth and maximum food conversion efficiency occurs is probably near or below 9.5°C. Although English sole juveniles were maintained for up to 1.5 years on Oregon Moist Pellets primarily, mortality was high during experiments (between 16 and 48 percent). The high mortality may have been associated with the pellet diet used, which is formulated to meet the nutritional requirements of salmonids and not flatfishes.--From abstr.

79-000096 Windell, J. T.; Foltz, J. W.; Sarokon, J. A. EFFECT OF FISH SIZE, TEMPERATURE, AND AMOUNT FED ON NUTRIENT DIGESTIBILITY OF A PELLETED DIET BY RAINBOW TROUT, /SALMO GAIRDNERI/. Trans. Am. Fish. Soc. 107 (4): 613-616. July 1978. SFA 24(1)

[Dep. Environ. Popul. Organ. Biol., Univ. Colo., Boulder 80309]

MISCELLANEOUS CULTURE TECHNIQUES AND EQUIPMENT

79-000097 Rottmann, R. W.; Anderson, R. O. LIMNOLOGICAL AND ECOLOGICAL EFFECTS OF GRASS CARP IN PONDS. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 24-39. 1976[1978]. SFA 24(1)

[R. O. Anderson: Mo. Coop. Fish. Res. Unit, Univ. Mo., Columbia 65201] The feeding activity of grass carp (/Ctenopharyngodon idella/) significantly reduced the final biomass of submerged plants in Missouri ponds. Water quality was imporved; total alkalinity and pH were sustained at levels more suitable for productivity. Nocturnal oxygen depletion was less severe, and noxious phytoplankton blooms did not develop in ponds stocked with grass carp. Grass carp had no significant effect on abundance of glass shrimp (/Palaemonetes kadiakensis/); bluegills (/Lepomis macrochirus/) had a much greater negative effect. In six of eight ponds with grass carp the densities of fathead minnows (/Pimephales promelas/) were greater than in any control pond. Young bluegills were significantly more abundant in ponds with grass carp. Bluegill growth was negatively correlated with bluegill density, but not with grass carp biomass. Average total apparent fish production was 270 percent greater in ponds with grass carp than in control ponds.

GENERAL LIMNOLOGY AND OCEANOGRAPHY

79-000098 Baker, J. R.; Deacon, J. E.; Burke, T. A.; Egdorf, S. S.; Paulson, L. J.; Tew, R. W. LIMNOLOGICAL ASPECTS OF LAKE MEAD, NEVADA-ARIZONA. U.S. Dep. Interior Bur. Reclam. REC-ERC-77-9. v + 83p. June 1977. SFA 24(1)
[Dep. Biol. Sci., Univ. Nev., Las Vegas]

79-000099 Shearer, J. A. TWO DEVICES FOR OBTAINING WATER SAMPLES INTEGRATED OVER DEPTH. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 772. iv + 9p. July 1978. In English with French summ. SFA 24(1)
[Fish. Mar. Serv., Winnipeg, MB R3T 2N6, Canada]

PHYSICAL LIMNOLOGY AND OCEANOGRAPHY

79-000100 Brezonik, P. L. EFFECT ON ORGANIC COLOR AND TURBIDITY ON SECCHI DISK TRANSPARENCY. J. Fish. Res. Board Can. 35 (11): 1410-1416. Nov. 1978. In English with French summ. SFA 24(1)
[Dep. Environ. Eng. Sci., Univ. Fla., Gainesville 32611]

CHEMICAL LIMNOLOGY AND OCEANOGRAPHY

79-000101 Kunnemann, H.; Bashamohideen, M. A QUICK AND MODIFIED WINKLER-METHOD FOR MEASURING O(2)-CONSUMPTION OF AQUATIC ANIMALS. Experientia (Basel) 34 (9): 1242-1243. 15 Sept. 1978. SFA 24(1)
Zool. Inst. Univ., Lehrstuhl Zoophysiol., Olshausenstr. N 61, D-2300 Kiel 1, West Germany] A modified procedure for measuring O(2)-consumption, based on Winkler-method, is described. Instead of KI and HCl (or H(2)SO(4)) triphenylmethane-dye leukoterbelinblue I and citric acid are used.

BENTHOS

79-000102 Kathman, D. ARTIFICIAL SUBSTRATE SAMPLER FOR BENTHIC INVERTEBRATES IN PONDS, SMALL LAKES, AND RESERVOIRS. Prog. Fish-Cult. 40 (3): 114-115. July 1978. SFA 24(1)
[Biol. Dep. Tenn. Technol. Univ., Cookeville 38501]

79-000103 Morgan, M. D.; Beeton, A. M. LIFE HISTORY AND ABUNDANCE OF /MYSIS RELICTA/ IN LAKE MICHIGAN. J. Fish. Res. Board Can. 35 (9): 1165-1170. Sept. 1978. In English with French summ. SFA 24(1)
[Div. Environ. Stud., Univ. Calif., Davis 95616]

79-000104 Rosenberg, D. M. PRACTICAL SAMPLING OF FRESHWATER MACROZOOBENTHOS: A BIBLIOGRAPHY OF USEFUL TEXTS, REVIEWS, AND RECENT PAPERS. Fish. Environ. Can. Fish Mar. Serv. Tech. Rep. No. 790. iv + 15p. Aug. 1978. In English with French summ. SFA 24(1)
[Fish Mar. Serv., Freshwater Inst., Winnipeg, MB R3T 2N6, Canada]

PLANKTON

79-000105 Cooley, J. M.; Minns, C. K. PREDICTION OF EGG DEVELOPMENT TIMES OF FRESHWATER COPEPODS. J. Fish. Res. Board Can. 35(10): 1322-1329. Oct. 1978. In English with French summ. SFA 24(1)
[Fish. Mar. Serv., Great Lakes Biolimnol. Lab., burlington, ON L7R 4A6, Canada]

79-000106 McLaren, I. A. GENEPATION LENGTHS OF SCME TEMPERATE MARINE COPEPODS: ESTIMATION, PREDICTION, AND IMPLICATIONS. J. Fish. Res. Board Can. 35 (10): 1330-1342. Oct. 1978. In English with French summ. SFA 24(1)
[Biol. Dep., Dalhousie Univ., Halifax, NS B3H 4J1, Canada]

79-000107 Seepersad, B.; Crippen, R. W. USE OF ANILINE BLUE FOR DISTINGUISHING BETWEEN LIVE AND DEAD FRESHWATER ZOOPLANKTON. J. Fish. Res. Board Can. 35 (10): 1363-1366. Oct. 1978. In English with French summ. SFA 24(1)
[Beak Consultants Ltd., 6870 Goreway Dr., Mississauga, ON L4V 1L9, Canada]

MORPHOLOGY

79-000108 Akster, H. A.; Osse, J. W. M. MUSCLE FIBRE TYPES IN HEAD MUSCLES OF THE PERCH /PERCA FLUVIATILIS/ (L.), TELEOSTEI. A HISTOCHEMICAL AND ELECTROMYOGRAPHICAL STUDY. Neth. J. Zool. 28 (1): 94-110. Mar. 1978. SFA 24(1)
[Agric. Univ., Dep. Exp. Anim. Morphol. Cell Biol., Zodiac, Marijkeweg 40, Wageningen, The Netherlands]

79-000109 Alluchon-Gerard, M.-J. ULTRASTRUCTURE OF THE DOGFISH ADENOHYPOPHYSIS. Cell Tissue Res. 193 (1): 139-154. 1978. SFA 24(1)
[Lab. Biol. Anim., Cent. Rech. Biol. Biochem. Dev., Fac. Sci., Reims, France]

79-000110 Anderson, W. C.; Manion, P. J. TWO-TAILED PARASITIC-PHASE SEA LAMPREYS FROM THE GREAT LAKES. Prog. Fish-Cult. 40 (3): 107. July 1978. SFA 24(1)
[U.S. FWS, Sea Lamprey Control Stn., Marquette, MI 49855]

79-000111 Bell, G. R. PREPARATION OF RIGID PLASTIC CASTS OF THE BLOOD VESSELS OF FISH. Prog. Fish-Cult. 40 (3): 103-104. July 1978. SFA 24(1)
[Fish Mar. Serv., Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

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[Anat. Inst. Univ. Kiel, Olshausenstr. 40-60, D-2300 Kiel, West Germany]

79-000113 Brusle, S.; Brusle, J. EARLY SEX DIFFERENTIATION IN /MUGIL (LIZA) AURATUS/ RISSO, 1810 (TELEOST MUGILIDAE). AN ULTRASTRUCTURAL STUDY. Ann. Biol. Anim. Biochim. Biophys. 18 (4): 871-875. 1978. SFA 24(1)
[Lab. Biol. Mar., Centre Universitaire, Ave. de Perpignan, 66025 Perpignan Cedex, France]

79-000114 Burkhardt, D. A.; Hassin, G. INFLUENCES OF CONES UPON CHROMATIC- AND LUMINOSITY- TYPE HORIZONTAL CELLS IN PIKEPERCH RETINAS. J. Physiol. 281: 125-137. Aug. 1978. SFA 24(1)
[Vision Lab., Elliott Hall, Univ. Minn., 75 East River Rd., Minneapolis 55455]

79-000115 Buynak, G. L.; Mohr, H. W., Jr. LARVAL DEVELOPMENT OF THE REDBREAST SUNFISH (/LEPOMIS AURITUS/) FROM THE SUSQUEHANNA RIVER. Trans. Am. Fish. Soc. 107 (4): 600-604. July 1978. SFA 24(1)
[Ichthyological Assoc., Inc., R.D. 1, Berwick, PA 18603]

79-000116 Buynak, G. L.; Mohr, H. W., Jr. LARVAL DEVELOPMENT OF THE NORTHERN HOG SUCKER (/HYPENTELIUM NIGRICANS/), FROM THE SUSQUEHANNA RIVER. Trans. Am. Fish. Soc. 107 (4): 595-599. July 1978. SFA 24(1)
[Ichthyological Assoc., Inc., R.D. 1, Berwick, PA 18603]

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[CNRS, Lab. Physiol. Nerv., Dep. Neurophysiol. Sens., F-91190 Gif sur Yvette, France]

79-000118 Edwards, R. J.; Marsh, E.; Stevens, F. B., Jr. THE UTILITY OF THE AIR BLADDER POSITION IN DETERMINING SPECIFIC RELATIONSHIPS IN THE ATHERINID GENUS /MENIDIA/. Contrib. Mar. Sci. 21: 1-7. Aug. 1978. SFA 24(1)
[Dep. Zool., Univ. Texas, Austin 78712]

79-000119 Ekengren, B.; Peute, J.; Fridberg, G. THE DISTRIBUTION AND NATURE OF GONADOTROPIC CELLS IN THE ROSTRAL PARS DISTALIS OF THE ATLANTIC SALMON, /SALMO SALAR/. Ann. Biol. Anim. Biochim. Biophys. 18 (4): 799-804. 1978. SFA 24(1)
[Univ. Stockholm, Dep. Zool., Box 6801, 11386 Stockholm, Sweden]

79-000120 Evseenko, S. A. [SOME DATA ON METAMORPHOSIS OF LARVAE OF THE GENUS /BOTHUS/ (PISCES, BOTHIDAE) FROM THE CARIBBEAN SEA.] Zool. Zh. 57 (7): 1040-1047. July 1978. In Russian with English summ. SFA 24(1)
[All-Union Res. Inst. Mar. Fish. Oceanogr., moscow, USSR] During metamorphosis of the /Bothus/ larvae the right eye is displaced to the left side through the break in the head tissues under the dorsal fin base. The larval teeth disappear and the length of intestine markedly reduces, thus witnessing the preparation for change of the feeding type. The larvae at the last stages of metamorphosis and the pelagic fry are limited in their ability for active feeding due to some reasons. Apparently, they survive in the pelagic zone until their transition to the bottom at the expense of nutrients accumulated in the large liver.

79-000121 Fuiman, L. A.; Loos, J. J. MORPHOLOGICAL CHANGES DURING THE LARVAL DEVELOPMENT OF THE CUTLIPS MINNOW, /EXOGLOSSUM MAXILLINGUA/. Trans. Am. Fish. Soc. 107 (4): 605-612. July 1978. SFA 24(1)
[Dep. Nat. Resour., Fernow Hall, Cornell Univ., Ithaca, NY 14853]

79-000122 Gardiner, D. M. FINE STRUCTURE OF THE SPERMATOZOON OF THE VIPAROUS TELEOST, /CYMATOGASTER AGGREGATA/. J. Fish Biol. 13 (4): 435-438. Oct. 1978. SFA 24(1)
[Dep. Biol., Occidental Coll., Los Angeles, CA 90041]

79-000123 Geraudie, J. THE FINE STRUCTURE OF THE EARLY PELVIC FIN BUD OF THE TROUTS /SALMO GAIRNDERI/ AND /S. TRUTTA FARIO/. Acta Zool. (Stockh.) 59 (2): 85-96. 1978. SFA 24(1)
[Lab. Anat. Comp., Univ. Paris VII, France]

79-000124 Giraud, M.-M.; Castanet, J.; Meunier, F.-J.; Bouligand, Y. ORGANISATION SPATIALE DE L'ISOPEDINE DES ECAILLES DU COELACANTHE (/LATIMERIA CHALUMNAE/, SMITH). [SPATIAL ORGANIZATION OF ISOPEDINE IN THE SCALES OF THE COELACANTH (/LATIMERIA CHALUMNAE/, SMITH).] C. R. Hebd. Seances Acad. Sci. Ser. D Sci. Nat. 287 (5): 487-489. 18 Sept. 1978. In French with English summ. SFA 24(1)
[Cent. Cytol. Exp., C.N.R.S., 67, rue M. Gunsbourg, 94200 Ivry-sur-Seine, France] Isopedine is a network of collagen bundles present in the scales of most fishes. The scales of the Coelacanth /Latimeria/ show a remarkable arrangement of this network, which is similar to a regularly double twisted plywood. The successive layers cross at an angle which differs slightly from a right angle, the result being that the whole system is twisted.

79-000125 Gosheva, T. D. OTOLITH STRUCTURE AND GROWTH CHARACTERISTICS OF THE WHITE SEA HERRING (/CLUPEA HARENGUS MARIS-ALBI/). J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (6): 872-877. 1977. SFA 24(1)
[PINRO, Archangel, USSR] An examination is made of the external structure of the otoliths, the time of annulus formation and the growth characteristics of the White Sea herring (/Clupea harengus maris-albi/). The completed state of the annulus on otoliths is more clearly manifested in the spring, but the mark does not become clearly discernible until new growth appears. Marked differences have been found in otolith structure and the nature of growth between the Onega and Dvina herring and Mezen herring. Differences in the indicators of the absolute increment indicate different feeding ranges.

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[Dep. Biol., Univ. Saskatchewan, Saskatoon, SK S7N 0W0, Canada] In central Saskatchewan gonad weights of male and female fathead minnows reach peak values between June 1 and July 31. The precise timing of the peak seems to be determined by local weather (temperature). Gonad histology shows a predominance of early gametogenic stages during winter with gametogenesis being completed in the spring. The histology of the dorsal skin is similar in both sexes during the nonbreeding season but males develop a dorsal pad during the breeding season. Pad development involves seasonal changes in epidermal thickness, mucous cell number, and dermal connective tissue thickness. Males also lose their alarm substance cells briefly during the peak breeding period.

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79-000147 CONTINUED
substances has no negative effect on the embryonic development of the carp. Two new substances for degumming eggs, talc and milk, which have been verified commercially and are beginning to be used in fish hatcheries, are suggested for the purpose.

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[Paul Ehrlich Inst., Paul Ehrlich Str. 42-44, D-6000 Frankfurt, West Germany]

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[Dep. Oceanol., Casilla 13-D, Vina del Mar, Chile]

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[Dep. Fish. Mar. Resour., Coll. Agric., Univ. Basrah, Basrah, Iraq] The testes of /Barbus luteus/ are a pair of elongated structures composed of an anastomosing system of seminiferous lobules. Six spermatogenetic stages of germ cells have been described in the gonad. The endocrine factor lies in the interstitial cells. Spermiation occurs during the months of May, June and July. Fertilization appears to be external. Unexpelled spermatozoa undergo pycnotic degeneration. The testes show a regular annual cycle which has been described in five arbitrary stages.

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[Cent. Oceanol. Bretagne (CNEXO), BP 337, 29273 Brest Cedex, France]

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[Inst. Biol., USSR Acad. Sci., Petrozavodsk, USSR] A description is given of the fatty acid composition of cavity fat in "wild" and "hatchery" juvenile salmon, /Slamo salar/ (age 1+ and 2), and also that of the artificial mixed feeds and the river zoobenthos that predominate in the food of parr. It is established that there is a correlation in fatty acid content between the cavity fat of "wild" and "hatchery" juveniles and the composition of the food. The considerable difference in the composition of the reserve lipid in juveniles reared on artificial feeds and in those living in rivers is an indication that the diet of "hatchery" juveniles is unbalanced in fatty acid composition.

79-000161 Bone, Q.; Kiceniuk, J.; Jones, D. R. ON THE ROLE OF THE DIFFERENT FIBRE TYPES IN FISH MYOTOMES AT INTERMEDIATE SWIMMING SPEEDS. NOAA Fish. Bull. 76 (3): 691-699. July 1978. SFA 24(1)
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[Landesanstalt fur Fischeries NW, 5942 Kirchhundem 1, West Germany]

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[Lab. Physiol. Poissons, I.N.R.A., 78350 Jouy en Josas, France]

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[freshwater Inst., 501 University Crescent, Winnipeg, MB R3T 2N2, Canada]

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[Fish. Dev. Corp. S.A., Box 149, Gingindlovu 3800, South Africa] A reappraisal of oxygen uptake by /Sarotherodon mossambicus/ was undertaken using a continuous flow respirometer. Measurements were obtained over the temperature range 16° C-37° C for fish weighing between 10 g and 150 g. Oxygen uptake was converted to energy equivalents (Q(ox)) using the value 13.68 J mg $O(2)^{-1}$ and the routine metabolic energy expenditure can be described by the equation $E=0.0086\ t^{2.0783}\ M^{0.652}$ where E is the energy requirement for routine metabolism expressed in J h^{-1}, t the temperature in °C and M the mass in g.

79-000174 Chambolle, P.; Kah, O.; Olivereau, M. ETUDE DU CONTROLE HYPOTHALAMIQUE DE AL FONCTION GONADOTROPE CHEZ /GAMBUSIA/ SP. (POISSON TELEOSTEEN) PAR LA TECHNIQUE DES GREFFES. [GONADOTROPIC FUNCTION IN THE TELEOST /GAMBUSIA/ SP. A STUDY OF HYPOTHALAMIC CONTROL USING GRAFTS.] Ann. Biol. Anim. Biochim. Biophys. 18 (4): 825-829. 1978. In French with English summ. SFA 24(1)
[Lab. Biol. Anim. A., C.N.R.S., Univ. Bordeaux 1, Ave. des Facultes, 33405 Talence, France]

79-000175 Chao, L. P.; Birkbeck, T. H. STORAGE OF MARINE FISH ERYTHROCYTES IN LIQUID NITROGEN. J. Fish Biol. 13 (4): 483-488. Oct. 1978. SFA 24(1)
[Dep. Microbiol., Univ. Glasgow, Alexander Stone Bldg., Garscube Estate, Bearsden, Glasgow G61 1QH, Scotland] The preservation of erythrocytes from cod (/Gadus morhua/), saithe (/Pollachius virens/) and mackerel (/Scomber scombrus/) at -196° C was studied using dimethyl sulphoxide (DMSO) as a cryoprotectant. Erythrocyte recoveries of greater than 90 percent were obtained from all species and cod erythrocytes were stored for eighteen months with insignificant lysis. Larger quantities of blood were stored by removal of plasma from

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citrated blood prior to the addition of DMSO solution, and by storage of pelleted frozen blood in aluminium canisters in liquid nitrogen. Maximum recoveries of washed intact erythrocytes required thawing of pellets in 12.5 percent DMSO solution and washing with buffer containing decreasing concentrations of DMSO. Washed erythrocytes kept at 4° for at least two days showed little haemolysis, were morphologically similar to fresh erythrocytes and equally susceptible to the delta-haemolysin of /Staphylococcus aureus/.

79-000176 Chernyanev, Zh. A. MORPHO-ECOLOGICAL CHARACTERISTICS OF THE REPRODUCTION AND DEVELOPMENT OF THE BAIKAL SAND SCULPIN, /PARACOTTUS (LEOCOTTUS) KESSLERI/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (6): 890-903. 1977. SFA 24(1)
[USSR Acad. Sci., Moscow, USSR] A study has been made of the biology of the Baikal sand sculpin, /Paracottus (Leocottus) kessleri/, one of the two Baikal sculpin species whose range extends beyond lake Baikal. A morphological description is given of embryonic and larval development and an examination is made of the assumed evolutionary paths that led the ancestors of the sand sculpin to give rise to viviparous /Comephorus/ species, as is indicated by an anlysis of their embryonic and larval development.

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[Fish. Mar. Serv., Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada] Underyearling and yearling coho as well as underyearling chinook salmon were given a seawater challenge test in order to determine the progress of smoltification. Both yearling coho reared under conventional hatchery conditions and accelerated underyearling coho reared in heated brackish water were smolted in May. Most groups of hatchery chinook were not fully smolted at the time of release. Osmoregulatory ability of underyearling coho improved rapidly with increasing size to about 6 g. Chinook fry showed a similar improvement up to a size of 4-5 g.

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[Inst. Anim. Biol., Univ. Padua, Via Loredan 10, 35100 Padua, Italy]

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[Geoheat Utilization Cent., Oreg. Inst. Technol., Klamath Falls 97601]

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[Dep. Oceanogr., The University, Southampton, England]

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[Dep. Oceanogr., The University, Southampton, England]

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[Mar. Sci. Res. Lab. Memorial Univ. Newfoundland, St. John's, NF A1C 5S7, Canada]

79-000183 Curry, K. D.; Kynard, B. EFFECT OF EXTENDED GALVANONARCOSIS ON BEHAVIOR OF RAINBOW TROUT, /SALMO GAIRDNERI/, AND CHANNEL CATFISH, /ICTALURUS PUNCTATUS/. J. Fish. Res. Board Can. 35 (10): 1297-1302. Oct. 1978. In English with French summ. SFA 24(1)
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[Dep. Physiol., Tokyo Metro. Inst. Gerontol., 35-2 Sakaecho, Itabashiku, Tokyo-173, Japan] Lipopolysaccharide (LPS) applied to the anterior brainstem of the carp caused lightening of body colour. This indicates that an increase in set point temperature is responsible for increased cutaneous autonomic activity following LPS-administration.

79-000244 O'Brien, R. N.; Visaisouk, S.; Raine, R.; Alderdice, D. F. NATURAL CONVECTION: A MECHANISM FOR TRANSPORTING OXYGEN TO INCUBATING SALMON EGGS. J. Fish. Res. Board Can. 35 (10): 1316-1321. Oct. 1978. In English with French summ. SFA 24(1)
[Dep. Chem., Univ. Victoria, Victoria, BC V8W 2Y2, Canada]

79-000245 Ohnishi, M.; Tsuchiya, T.; Matsumoto, J. J. ELECTRON MICROSCOPIC STUDY OF THE CRYOPROTECTIVE EFFECT OF AMINO ACIDS ON FREEZE DENATURATION OF CARP ACTOMYOSIN. Bull. Jpn. Soc. Sci. Fish. 44 (7): 755-762. July 1978. SFA 24(1)
[Dep. Chem., Sophia Univ., Kioi-chio 7, Chiyoda-ku, Tokyo, Japan 102]

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[Inst. Biofisica, Univ. Fed. Rio de Janeiro, Cidade Univ., 20,000 Rio de Janeiro, Brazil]

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[Lab. Physiol., Inst. Oceanogr., 195 rue Saint-Jacques, 75005 Paris, France]

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[Dep. Psychol., Univ. New Orleans, New Orleans, LA 70122]

79-000250 Perera, P. A. B.; De Silva, S. S. STUDIES ON THE CHEMICAL BIOLOGY OF YOUNG GREY MULLET, /MUGIL CEPHALUS/ L. J. Fish Biol. 13 (3): 297-304. Sept. 1978. SFA 24(1)
[Ceylon Inst. Sci. Ind. Res., P.O. Box 787, Bauddhaloka Mawatha, Colombo-7, Sri Lanka] The chemical composition of tank and pond reared and wild young grey mullet, /Mugil cephalus/ L., ranging in length from 15 to 75 mm was studied. Tank reared mullet had a higher percentage of protein, carbohydrate, total lipid and a lower moisture content than wild fish. These differences are attributed to the artificial diet, available in excess, as well as the relatively inactive life in the confined spaces of the rearing tanks. /M. cephalus/ in general has a high percentage of total lipid and therefore, can be classified as a 'fatty' fish. The highest level of protein in tank reared fish was found in those kept at a salinity of 20 °/oo. Fish reared on an excess diet in fresh water tended to show a close similarity to wild fish in trends of change of chemical constituents with growth.

79-000251 Peter, R. E.; Crim, L. W. HYPOTHALAMIC LESIONS OF GOLDFISH: EFFECTS ON GONADAL RECRUDESCENCE AND GONADOTROPIN SECRETION. Ann. Biol. Anim. Biochim. Biophys. 18 (4): 819-823. 1978. SFA 24(1)
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[Dep. Zool., Univ. Alberta, Edmonton, AB T6G 2E9, Canada]

79-000253 Pfeiffer, W. HETEROCYCLIC COMPOUNDS AS RELEASERS OF THE FRIGHT REACTION IN THE GIANT DANIO /DANIO MALABARICUS/ (JERDON) (CYPRINIDAE, OSTARIOPHYSI, PISCES). J. Chem. Ecol. 4 (6): 665-673. Nov. 1978. SFA 24(1)
[Inst. Biol., Univ. Tubingen Morgenstelle 28, D-7400 Tubingen, West Germany] Fifty-nine pteridine, purine, and pyrimidine derivatives were tested with schools of the giant danio /Danio malabaricus/ (Jerdon). The fright reaction was elicited by three pteridine derivatives: 2,6-diamino-4 -oxodihydropteridine, isoxanthopterin, and 6-acetonylisoxanthopterin. A minor effect could not be excluded for three purine derivatives: I-5-MP, IDP, and ITP.

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[67 Curtner Ave., Palo Alto, CA 94306]

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[Dep. Biol., Univ. Calif., Los Angeles 90024]

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[Agric. Univ., Dep. Exp. Anim. Morphol. Cell Biol., Marijkeweg 40, Wageningen, The Netherlands]

79-000257 Ross, L. G. THE INNERVATION OF THE RESORPTIVE STRUCTURES IN THE SWIMBLADDER OF A PHYSOCLIST FISH /POLLACHIUS VIRENS/ (L.). Comp. Biochem. Physiol. C Comp. Pharmacol. 61 (2): 385-388. 1978. SFA 24(1)
[Unit Aquatic Pathobiol., Univ. Stirling, Stirling FH9 4LA, Scotland]

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[Zool. Inst. Univ., Luisenstrasse 14, D-8000 Munchen 2, West Germany]

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[Lab. Biochim. Phys., I.N.R.A., Dep. Biochim. Biophys., Univ. Paris-Sud 81405 Orsay Cedex, France]

79-000260 Sanches-Rodriguez, M.; Escaffre, A.-M.; Marlot, S.; Reinaud, P. THE SPERMIATION PERIOD IN THE RAINBOW TROUT (/SALMO GAIRDNERI/). PLASMA GONADOTROPIN AND ANDROGEN LEVELS, SPERM PRODUCTION AND BIOCHEMICAL CHANGES IN THE SEMINAL FLUID. Ann. Biol. Anim. Biochim. Biophys. 18 (4): 943-948. 1978. SFA 24(1)
[Lab. Physiol. Poissons, I.N.R.A., 78350 Jouy en Josas, France]

79-000261 Saunders, R. L.; Sreedharan, A. THE INCIDENCE AND GENETIC IMPLICATIONS OF SEXUAL MATURITY IN MALE ATLANTIC SALMON PARR. N. Am. Salmon Res. Cent. Rep. No. 2-1978. 8p. 1978. SFA 24(1)
[Box 488, St. Andrews, NB E0G 2X0, Canada] There were differences in the incidence of sexually mature (dwarf) males among purebred and hybrid strains of Atlantic salmon reared in a hatchery with spawn taken from wild salmon collected in several New Brunswick rivers and fertilized according to a diallel mating scheme. Dwarf males developed in both young-of-the-year, which had been hatched and reared at elevated temperatures during the winter, and those in their second year following hatching and rearing at prevailing ambient temperatures. Mature males were usually smaller than immature males and females and grew more slowly during August - November. Total lipid decreased and moisture content increased in dwarf males during late summer and autumn; immature parr had increasing lipid and decreasing moisture during this period. Consideration is given to the energetic effects of this early sexual maturation and the genetic implications.

79-000262 Schott, J. W. A HERMAPHRODITIC CALIFORNIA HALIBUT, /PARALICHTHYS CALIFORNICUS/. Calif. Fish Game 64 (3): 221-222. July 1978. SFA 24(1)
[Calif. Dep. Fish Game, 350 Golden Gate Shore, Long Beach 90802]

79-000263 Schwerdtfeger, W. K.; Bereiter-Hahn, J. TRANSIENT OCCURRENCE OF CHLORIDE CELLS IN THE ABDOMINAL EPIDERMIS OF THE GUPPY, /POECILIA RETICULATA/ PETERS, ADAPTED TO SEA WATER. Cell Tissue Res. 191 (3): 463-471. 16 Aug. 1978. SFA 24(1)
[Max Planck-Inst. Hirnforsch., Deutschordenstr. 46, D-6000 Frankfurt/M, West Germany]

79-000264 Shackley, S. E.; King, P. E. PROTEIN YOLK SYNTHESIS IN /BLENNIUS PHOLIS/ L. J. Fish Biol. 13 (2): 179-193. Aug. 1978. SFA 24(1)
[Dep. Zool., Univ. Coll. Swansea, Singleton Park, Swansea, Wales] Acrylamide gel electrophoresis indicates the presence of a group of proteins in the blood serum and liver of the female fish which are probably responsible for the accumulation of the protein yolk in the ovary. Immunological tests confirm that these high molecular weight proteins are the protein yolk precursors synthesized in the female liver and transported by the blood serum to the ovary where they accumulate in the developing oocytes.

79-000265 Shidoji, Y.; Muto, Y. COMPARATIVE STUDIES ON BINDING PROTEINS SPECIFIC FOR RETINOL SERUM AND CYTOSOL OF YOUNG YELLOWTAIL /SERIOLA QUINQUERADIATA/. Comp. Biochem. Physiol. B Comp. Biochem. 61 (2): 315-319. 1978. SFA 24(1)
[Dep. Nutr., Sch. Health Sci., Fac. Med., Univ. Tokyo, Hongo, Tokyo, Japan]

79-000266 Singley, J. A. HYPOPHYSEAL-ADRENOCORTICAL RESPONSE TO STRESS IN THE GOLDFISH, /CARASSIUS AURATUS/ L. Ph.D. dissertation, Wayne State Univ. 148p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(3):1094. Sept. 1978. SFA 24(1)

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[Dep. Zool., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada]

79-000268 Sokolowska, M.; Popek, W.; Bieniarz, K. SYNTHETIC RELEASING HORMONES LH/FSH-RH AND LH-RH: EFFECT OF INTRACEREBRAL AND INTRAMUSCULAR INJECTIONS ON FEMALE CARP (/CYPRINUS CARPIO/ L.) MATURATION. Ann. Biol. Anim. Biochim. Biophys. 18 (4): 963-967. 1978. SFA 24(1)
[Inst. Appl. Zool., Acad. Agric., 30-059 Krakow, Poland]

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[Dep. Mar. Sci., La. State Univ., Baton Rouge 70803]

79-000270 Sternik, K.-H. EINE METHODE ZUR KONTINUIERLICHEN BESTIMMUNG DER PHOSPHATEXKRETION VON FISCHEN UNTER VERWENDUNG EINES ANIONENAUSTAUSCHERHARZES. [A METHOD FOR THE CONTINUOUS DETERMINATION OF THE PHOSPHATE EXCRETION BY FISH BY MEANS OF ANION EXCHANGE RESIN.] Arch. Hydrobiol. Supplementb. 55 (1): 24-61. 1978. In German with English summ. SFA 24(1)
[Limnol. Inst., Univ. Freiburg, Mainaestrasse 212, D-7750 Konstanz-Egg, West Germany] A method is described for the continuous determination of phosphate excretion by fish using an anion exchange resin. Physical and chemical properties of the apparatus and the recovery of orthophosphate from the ion-exchange column after loading it with synthetic and excretion solutions are examined and discussed. Some initial observations on the phosphate excretion of carp (/Cyprinus carpio/ L.) are considered.

79-000271 Sumpter, J. P.; Follett, B. K.; Dodd, J. M. STUDIES ON THE PURIFICATION OF GONADOTROPHIN FROM DOGFISH (/SCYLIORHINUS CANICULA/ L.) PITUITARY GLANDS. Ann. Biol. Anim. Biochim. Biophys. 18 (4): 787-791. 1978. SFA 24(1)
[Dep. Zool., Brambell Lab., Univ. Coll. North Wales, Bangor, Gwynedd, LL57 2UW, Wales]

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[Sch. Biol. Sci., Univ. Sains Malaysia, Penang, Malaysia]

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79-000274 Tarr, R. J. Q.; Hill, B. J. OXYGEN CONSUMPTION, FOOD ASSIMILATION AND ENERGY CONTENT OF SOUTHERN AFRICAN ELVERS (/ANGUILLA/ SP.). Aquaculture 15 (2): 141-150. Oct. 1978. SFA 24(1)
[Zool. Dep., Rhodes Univ., Grahamstown, South Africa] Juvenile eels (elvers) of three age classes were studied. Dry weights and ash-free dry weights were determined and expressed as percentages of wet weights. Mean values of 17.33 percent and 15.91 percent were obtained for dry weight and ash-free dry weight, respectively. Energy contents were determined, mean values being 4.26 kJ g^{-1} wet weight, 23.93 kJ g^{-1} dry weight and 26.08 kJ g^{-1} ash/free dry weight. Oxygen consumption of inactive elvers was measured and can be described by the equation: log oxygen consumption (ul g^{-1} h^{-1}) = 3.19 - 0.39 log wet weight (mg). Uptake by active elvers was double that of inactive elvers. For a 127-mg elver, the efficiency of assimilation of food formula was 88.57 percent based on dry weights, and 92.70 percent based on energy. The elvers ingested 4.4 percent of their wet body weight in one feeding.

79-000275 Tayamen, M. M.; Shelton, W. L. INDUCEMENT OF SEX REVERSAL IN /SAROTHERODON NILOTICUS/ (LINNAEUS). Aquaculture 14 (4): 349-354. Aug. 1978. SFA 24(1)
[Bur. Fish. Aquatic Resour., Region 1, Manila, Philippines] Two androgens, ethynyltestosterone (ET) and methyltestosterone (MT) and two estrogens, diethylstilbestrol (DES) and estrone (E) were orally administered to gonadally undifferentiated /Sarotherodon niloticus/ fry. Diets with hormones were prepared at the following levels: ET and MT at 30 and 60 mg kg^{-1} of feed, DES at 25 and 100 mg kg^{-1} of feed, and E at 100 and 200 mg kg^{-1} of feed. The fish were fed at 10 percent body weight per day for 25-, 35- and 59-day periods. All-male populations were produced with ET-60 and MT-60 in all three treatment periods, and with ET-30 and MT-30 during the 35- and 59-day treatments. No estrogen treatment resulted in 100 percent female populations but only about 10 percent of the DES-100 treatment populations at the three durations were males. Sex ratios were significantly different ($p < 0.01$) from the expected 1:1 ratio in all fish treated with androgens and estrogens. No ovotestis condition was found. Total mortalities in all treatments and controls were uniformly low, ranging from 1.5 to 8.8 percent for the treatment period.

79-000276 Terkatin-Shimony, A.; Yaron, Z. ESTROGENS AND ESTROGENIC EFFECTS IN /TILAPIA AUREA/ (CICHLIDAE, TELEOSTEI). Ann. Biol. Anim. Biochim. Biophys. 18 (4): 1007-1012. 1978. SFA 24(1)
[Dep. Zool., George S. Wise Cent. Life Sci., Tel-Aviv Univ., Tel-Aviv, Israel]

79-000277 Terlou, M.; de Jong, J. P.; van Oordt, P. G. W. J. SCANNING CYTOPHOTOMETRY: A METHOD FOR STUDYING THE AMOUNT OF NEUROSECRETORY MATERIAL IN THE PREOPTIC NUCLEUS OF THE TROUT (/SALMO GAIRDNERI/). Ann. Biol. Anim. Biochim. Biophys. 18 (4): 851-856. 1978. SFA 24(1)
[Zool. Lab., Sect. Comp. Endocrinol., Podualaan 8, Utrecht, The Netherlands]

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[Dep. Biol., Univ. Ala., University 35486]

79-000279 Umehara, S.; Oguri, M. EFFECTS OF ENVIRONMENTAL CALCIUM CONTENT ON PLASMA CALCIUM LEVELS IN GOLDFISH. Bull. Jpn. Soc. Sci. Fish. 44 (8): 827-833. Aug. 1978. SFA 24(1)
[Fish. Lab., Fac. Agric., Nagoya Univ., Nagoya 464, Japan] We investigated the effects of Ca^{2+} content in environmental water on plasma Ca^{2+} level, using goldfish as experimental fish. Plasma Ca^{2+} level increased markedly in the goldfish transferred to 1/3 sea water. However the level did not change in the goldfish transferred to Ca^{2+}-rich fresh-water. Furthermore, in the goldfish transferred to 1/3 sea water, the histological structures of the corpuscle of Stannius, water movement rate in intestine and Ca^{2+}-activated ATPase activity in gill changed significantly. On the contrary, these changes were not observed in the goldfish transferred to Ca^{2+}-rich fresh-water. From these results, we concluded that Ca^{2+} influx occured in goldfish reared in 1/3 sea water, but did not occur in the goldfish reared in Ca^{2+}-rich fresh-water.

79-000280 Upadhyay, S. N.; Breton, B.; Billard, R. ULTRASTRUCTURAL STUDIES ON EXPERIMENTALLY INDUCED VITELLOGENESIS IN JUVENIIE RAINBOW TROUT (/SALMO GAIRDNERI/ R.). Ann. Biol. Anim. Biochim. Biophys. 18 (4): 1019-1025. 1978. SFA 24(1)
[Lab. Physiol. Poissons, I.N.R.A., 78350 Jouy en Josas, France]

79-000281 van den Hurk, R.; Vermeij, J. A. J.; Stegenga, J.; Peute, J.; van Oordt, P. G. W. J. CYCLIC CHANGES IN THE TESTIS AND VAS DEFERENS OF THE RAINBOW TROUT (/SALMO GAIRDNERI/) WITH SPECIAL REFERENCE TO SITES OF STEROIDOGENESIS. Ann. Biol. Anim. Biochim. Biophys. 18 (4): 899-904. 1978. SFA 24(1)
[Zool. Lab., Sect. Comp. Endocrinol., Univ. Utrecht, The Netherlands]

79-000282 Van Voorhies, W. V.; Devries, A. L. GLYCOPROTEINS AS BIOLOGICAL ANTIFREEZE AGENTS IN THE COD, /GADUS OGAC/ (RICHARDSON). Physiol. Zool. 51 (4): 347-353. Oct. 1978. SFA 24(1)
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[Div. Nat. Conserv., P.O. Box 517, Bloemfontein, South Africa]

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[Div. Nat. Conserv., Box 517, Bloemfontein, South Africa]

79-000285 Vitvitsky, V. N. THERMOSTABILITY OF COLLAGEN OF EPIPELAGIC, BOTTOM NERITIC AND DEEP-WATER FISHES FROM THE CARIBBEAN REGION. Comp. Biochem. Physiol. A Comp. Physiol. 61 (4): 661-663. 1978. SFA 24(1)
[A.N. Belozersky Lab. Molec. Biol. Bioorgan. Chem., Moscow State Univ., Moscow 117234, U.S.S.R.]

79-000286 Wachtler, K. THE REGIONAL DISTRIBUTION OF CHOLINACETYL TRANSFERASE AND ACETYLCHOLINESTERASE IN THE BRAIN OF THE LAMPREY (/PETROMYZON FLUVIATILIS/). Comp. Biochem. Physiol. C Comp. Pharmacol. 61 (2): 411-413. 1978. SFA 24(1)
[Inst. Zool., Tierarztlichen Hochschule, Hannover, West Germany]

79-000287 Walker, M. G.; Emerson, L. SUSTAINED SWIMMING SPEEDS AND MYOTOMAL MUSCLE FUNCTION IN THE TROUT, /SALMO GAIRDNERI/. J. Fish Biol. 13 (4): 475-481. Oct. 1978. SFA 24(1)
[MAFF Fish. Lab., Lowestoft, NR33 0HT, England] Rainbow trout were trained for 3-4 weeks in a flume at swimming speeds of 1, 2 and 3 L S^{-1}. For each experiment growth rates were estimated and by measuring the hypertrophy of red and mosaic skeletal muscle fibres their function was described at particular swimmimg speeds and compared with earlier experiments on coalfish using the same technique. Maximum growth, compared with controls in still water, occurred at swimming speeds of 1 L S^{-1}. At this speed the trout mosaic muscle fibres hypertrophied by 40 percent but the red muscle fibres showed only a 25 percent hypertrophy. It is suggested that natural swimming speeds are close to 1 L S^{-1} and the trout mosaic fibres are better adapted for use at this speed in comparison with coalfish white muscle fibres.

79-000288 Warner, M. C.; Diehl, S. A.; Tomb, A. M. EFFECTS OF DILUTION AND TEMPERATURE OF ANALYSIS ON BLOOD SERUM VALUES IN RAINBOW TROUT, /SALMO GAIRDNERI/. J. Fish Biol. 13 (3): 315-319. Sept. 1978. SFA 24(1)
[U.S. Army Med. Bioeng., Res. Div. Lab, Fort Detrick, Frederick, MD 21701] Albumin, cholesterol, glucose, inorganic phosphorus, and total protein analyses were not affected by temperatures between 20 and 38°C nor by dilution with either 0.65 percent or 0.85 percent NaCl. Additionally, blood urea nitrogen, calcium and creatinine were unaffected by dilution. Alkaline phosphotase, cholinesterase, glutamic oxaloacetic transaminase, glutamic pyruvic transaminase, alpha-hydroxybutyrate dehydrogenase, lactic dehydrogenase, and phosphohexose isomerase were all affected by temperature. Results of dilution tests were generally inconclusive, while results of enzymatic reactions indicate that reaction temperatures must be closely controlled to produce comparable results.

79-000289 Watanabe, S.; Shimizu, M.; Yamada, J. [EFFECTS OF STORAGE ON THE STABILITY OF SERUM SAMPLES OF THE RAINBOW TROUT. I. SODIUM, POTASSIUM, CALCIUM, MAGNESIUM AND OSMOTIC CONCENTRATIONS.] Bull. Fac. Fish. Hokkaido Univ. 29 (1): 7-18. Mar. 978. In Japanese with English summ. SFA 24(1)
[Lab. Physiol. Ecol., Fac. Fish., Hokkaido Univ., Hakodate, Japan]

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[Lab. Physiol. Poissons, I.N.R.A., 78350 Jouy en Josas, France]

79-000291 Weiss, R. E. THE COMPARATIVE BIOLOGY OF OSTEOGENESIS AND RESORPTION IN FISH BONE. Ph.D. dissertation, Univ. S.C. 192p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(3):1154. Sept. 1978. SFA 24(1)

79-000292 Weiss, R. E.; Watabe, N. STUDIES ON THE BIOLOGY OF FISH BONE--II BONE MATRIX CHANGES DURING RESORPTION. Comp. Biochem. Physiol. A Comp. Physiol. 61 (2): 245-251. 1978. SFA 24(1)
[Dep. Biol., Univ. S.C., Columbia 29208]

79-000293 Westby, G. W. M.; Kirschbaum, F. EMERGENCE AND DEVELOPMENT OF THE ELECTRIC ORGAN DISCHARGE IN THE MORMYRID FISH, /POLLIMYRUS ISIDORI/. II. REPLACEMENT OF THE LARVAL BY THE ADULT DISCHARGE. J. Comp. Physiol. A Sens. Neural Behav. Physiol. 127 (1): 45-59. 1978. SFA 24(1)
[Dep. Psychol., Univ. Sheffield, Sheffield S10 2TN, England]

79-000294 White, A.; Fletcher, T. C.; Towler, C. M.; Baldo, B. A. ISOLATION OF A C-REACTIVE PROTEIN-LIKE PRECIPITIN FROM THE EGGS OF THE LUMPSUCKER (/CYCLOPTERUS LUMPUS/ L.). Comp. Biochem. Physiol. C Comp. Pharmacol. 61 (2): 331-336. 1978. SFA 24(1)
[N.E.R.C. Inst. Mar. Biochem., Aberdeen AB1 3RA, Scotland]

79-000295 Whitehead, C.; Bromage, N. R.; Forster, J. R. M.; Matty, A. J. THE EFFECTS OF ALTERATIONS IN PHOTOPERIOD ON OVARIAN DEVELOPMENT AND SPAWNING TIME IN THE RAINBOW TROUT (/SALMO GAIRDNERI/). Ann. Biol. Anim. Biochim. Biophys. 18 (4): 1035-1043. 1978. SFA 24(1)
[Dr. N. R. Bromage: Dep. Biol. Sci., Fish Cult. Unit, Univ. Aston in Birmingham, B4 7ET, England]

79-000296 Williams, D. R.; Giesy, J. P., Jr. RELATIVE IMPORTANCE OF FOOD AND WATER SOURCES TO CADMIUM UPTAKE BY /GAMBUSIA AFFINIS/ (POECILIIDAE). Trans. Ill. State Acad. Sci. 70 (2): 211. 1977. Abstract only. SFA 24(1)
[Drury Coll., Springfield, IL 65802] The relative importance of food and water as Cd sources to the mosquitofish, /Gambusia affinis/, was studied in a factorially designed experiment with two levels of Cd in food and water after 2, 4, 6, and 8 weeks of exposure. There was significant Cd uptake from water but no significant uptake from food except after 8 weeks in the presence of Cd in water. When exposed to a continous flow of 10 ug Cd/l in water, /G. affinis/ did not reach equilibrium Cd concentrations after 8 weeks.

79-000297 Wohlschlag, D. E.; Wakeman, J. M. SALINITY STRESSES, METABOLIC RESPONSES AND DISTRIBUTION OF THE COASTAL SPOTTED SEATROUT, /CYNOSCION NEBULOSUS/. Contrib. Mar. Sci. 21: 171-185. Aug. 1978. SFA 24(1)
[Univ. Tex. Mar. Sci. Inst., Port Aransas 78373]

79-000298 Wold, J. K.; Selset, R. GLYCOPROTEINS IN THE SKIN MUCUS OF THE CHAR (/SALMO ALPINUS/ L.)--II PRODUCTION OF MUCUS AFTER DEATH OF FISH. Comp. Biochem. Physiol. B Comp. Biochem. 61 (2): 271-273. 1978. SFA 24(1)
[Inst. Pharm., Univ. Oslo, P.O. Box 1068, Blindern, Oslo 3, Norway]

79-000299 Woo, N. Y. S.; Bern, H. A.; Nishioka, R. S. CHANGES IN BODY COMPOSITION ASSOCIATED WITH SMOLTIFICATION AND PREMATURE TRANSFER TO SEAWATER IN COHO SALMON (/ONCORHYNCHUS KISUTCH/) AND KING SALMON (/O. TSHAWYTSCHA/). J. Fish Biol. 13 (4): 421-428. Oct. 1978. SFA 24(1)
[H.A. Bern: Dep. Zool., Univ. Calif., Berkely 94720] Serum protein, glucose and fat levels were determined for Coho salmon parrs, freshwater smolts, seawater smolts, seawater stunts and freshwater desmolts. Liver and muscle glycogen, fat, protein and water concentrations were also calculated. Serum protein, glucose and fat levels were significantly lower in the freshwater smolts than in the parrs. furthermore, both liver and muscle total fat levels were markedly decreased in the smolts, suggesting that smoltification is associated with increased catabolism. Smolts that failed to reach seawater by late summer reverted to a parr-like appearance and also regained the biochemical characteristics of parrs (high body fat and glycogen). Premature transfer of Coho presmolts into seawater caused impaired growth (stunting). Stunted Coho had higher muscle protein levels than normal smolts and parrs. Tissue water levels were not significantly different between stunts and normal seawater smolts, suggesting that the stunting phenomenon may not be caused primarily by osmoregulatory failure but may be due to shifts in metabolic patterns. In contrast to the pronounced changes seen in Coho salmon, transfer of King salmon to seawater did not result in increased catabolism of body reserves or in the production of stunts.

79-000300 Wu, S. M.; Dowling, J. E. L-ASPARTATE: EVIDENCE FOR A ROLE IN CONE PHOTORECEPTOR SYNAPTIC TRANSMISSION IN THE CARP RETINA. Proc. Natl. Acad. Sci. U.S.A. 75 (10): 5205-5209. Oct. 1978. SFA 24(1)
[Biol. Lab., Harvard Univ., Cambridge, MA 02138]

79-000301 Yamamoto, M.; Hirano, T. MORPHOLOGICAL CHANGES IN THE ESOPHAGEAL EPITHELIUM OF THE EEL, /ANGUILLA JAPONICA/, DURING ADAPTATION TO SEAWATER. Cell Tissue Res. 192 (1): 25-38. 1978. SFA 24(1)
[T. Hirano: Ocean Res. Inst., Univ. Tokyo, Nakano, Tokyo, Japan 164]

79-000302 Yamamoto, Y.; Sato, M.; Ikeda, S. EXISTENCE OF L-GULONOLACTONE OXIDASE IN SOME TELEOSTS. Bull. Jpn. Soc. Sci. Fish. 44 (7): 775-779. July 1978. SFA 24(1)
[Dep. Fish., Fac. Agric., Kyoto Univ., kyoto, Japan]

79-000303 Yano, T.; Ishio, S. STEROID HORMONE METABOLITES IN FISH URINE--I. IDENTIFICATION OF ANDROSTERONE, ETIOCHOLANOLONE, AND DEHYDROEPIANODROSTERONE ISOLATED FROM THE URINE OF CARP. Bull. Jpn. Soc. Sci. Fish. 44 (9): 1023-1028. Sept. 1978. SFA 24(1)
[Lab. Fish. Chem., Fac. Agric., Kyushu Univ., Fukuoka, Japan]

79-000304 Zohar, Y.; Abraham, M.; Gordin, H. THE GONADAL CYCLE OF THE CAPTIVITY-REARED HERMAPHRODITIC TELEOST /SPARUS AURATA/ (L.) DURING THE FIRST TWO YEARS OF LIFE. Ann. Biol. Anim. Biochim. Biophys. 18 (4): 877-882. 1978. SFA 24(1)
[I.N.R.A., Lab. Physiol. Poissons, 78350 Jouy en Josas, France]

GENETICS, VARIATION STUDIES AND HYBRIDIZATION

79-000305 Andreyev, V. L.; Reshetnikov, Yu. S. STUDY OF THE INTRASPECIFIC MORPHOLOGICAL VARIABILITY OF THE WHITEFISH, /COREGONUS LAVARETUS/, BY MULTIVARIATE STATISTICAL ANALYSIS. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (5): 727-741. 1978. SFA 24(1)
[USSR Acad. Sci., Vladivostok, USSR] Similarities of eleven whitefish populations (/Coregonus lavaretus/) from different areas of the Soviet Union were compared in respect of a total of 26 morphological characters. The results are presented in the form of dendrograms illustrating the reciprocal "generalized" distances of all populations in the different description systems. The "divergence" of of S. Kul'bak was used as the indicator of phenetic similarity. This indicator is also used for the selection of different informative characters and for the plotting of non-linear discriminant functions for the separate groupings of the populations. The defects of "univariate" methods of processing morphological measurements are discussed in detail, as is the objective and subjective content of methods based on the use of the computer.

79-000306 Gall, G. A. E.; Gross, S. J. A GENETICS ANALYSIS OF THE PERFORMANCE OF THREE RAINBOW TROUT BROODSTOCKS. Aquaculture 15 (2): 113-127. Oct. 1978. SFA 24(1)
[Dep. Anim. Sci., Univ. Calif., Davis] The reproductive performance of three domesticated rainbow trout broodstocks spawning at 2 years of age was analysed using data collected over a period of 5 years. Data were collected for post-spawning body weight, volume of eggs spawned, egg size, egg number and fertility to the eyed egg stage. There were significant differences among the stocks attributable to both genetic and environmental causes. In addition, there were marked differences between year-classes, isolated from each other due to 2-year spawning. The differences appeared to be genetic in origin and demonstrated the effect of sampling the original parents. It is recommended that selection for egg size be included in all selection programs and that egg number be ignored in any selection program designed to increase body size.--From abstr.

79-000307 Goren, M.; Rychwalski, E. M. HYBRIDS OF /APHANIUS DISPAR/ AND /APHANIUS MENTO/ (CYPRINODONTIDAE: PISCES). Zool. J. Linn. Soc. 63 (3): 259-264. July 1978. SFA 24(1)
[Dep. Zool., Tel-Aviv Univ., Tel-Aviv, Israel]

79-000308 Kerby, J. H. DEVICE FOR PREPARING IMPROVED CHROMOSOME SQUASHES. Prog. Fish-Cult. 40 (3): 120. July 1978. SFA 24(1)
[N. Car. Coop. Fish. Res. Unit, N. Car. State Univ., Raleigh 27650]

79-000309 Klar, G. T. ADAPTIVE SIGNIFICANCE OF LACTATE DEHYDROGENASE B^2 ISOZYMES IN RAINBOW TROUT, /SALMO GAIRDNERI/ AND A BIOCHEMICAL GENETIC COMPARISON OF CUTTHROAT TROUT (/SALMO CLARKI/) POPULATIONS. Ph.D. dissertation, Utah State Univ. 111p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(5):2078. Nov. 1978. SFA 24(1)

79-000310 Nagy, A.; Rajki, K.; Horvath, L.; Csanyi, V. INVESTIGATION ON CARP, /CYPRINUS CARPIO/ L. GYNOGENESIS. J. Fish Biol. 13 (2): 215-224. Aug. 1978. SFA 24(1)
[Lab. Behav. Genet., L. Eotvos Univ., 2131 God, Hungary] A reliable method for gynogenetic mass-production has been developed in carp (/Cyprinus carpio/ L.). The effect of different cold shock treatments applied after fertilization were examined. The yield of viable diploid gynogenetic animals could be significantly increased when the cold shock was applied 5 min or 15 min after fertilization. A negative correlation has been found between the effectiveness of these two treatments, so both were used on separate batches of eggs. By means of gynogenesis, the crossover frequency and map distance of the transferrin locus have been determined. Successful pilot experiments were made on grass carp (/Ctenopharyngodon idella/ Val.) and sheatfish (/Silurus glanis/ L.) with respect to gynogenetic mass production.

79-000311 Nayudu, P. L.; Hunter, C. R. GENETIC CONTROL OF MELANOPHORE ULTRASTRUCTURE IN /POECILIA RETICULATA/. J. Fish Biol. 13 (4): 453-456. Oct. 1978. SFA 24(1)
[Dep. Obstetrics Gynecol., Monash Univ., Queen Victoria Med. Cent., 172 Lonsdale St., Melbourne, Victoria 3000, Australia]

79-000312 Rishi, K. K. A PRELIMINARY REPORT ON THE KARYOTYPES OF EIGHTEEN MARINE FISHES. Res. Bull. Panjab Univ. Sci. 24 (3,4): 161-162. Dec. 1973. SFA 24(1)
[Dep. Zool., Kurukshetra Univ., Kurukshetra, Haryana, India]

79-000313 Scholl, A.; Corzillius, B.; Villwock, W. BEITRAG ZUR VERWANDTSCHAFTSANALYSE ALTWELTLICHER ZAHNKARPFEN DER TRIBUS APHANIINI (PISCES, CYPRINODONTIDAE) MIT HILFE ELEKTROPHORETISCHER UNTERSUCHUNGSMETHODEN. [CONTRIBUTION TO THE GENETIC RELATIONSHIP OF OLD WORLD APHANIINI (PISCES, CYPRINIDONTIDAE) WITH SPECIAL REFERENCE TO ELECTROPHORETIC TECHNIQUES.] Z. Zool. Syst. Evolutionsforsch. 16 (2): 116-132. Aug. 1978. In German with English and French summ. SFA 24(1)
[Zool. Inst., Univ. Bern, Sahlistr. 8, CH-3012 Bern, Switzerland]

79-000314 Schreibman, M. P.; Kallman, K. D. THE GENETIC CONTROL OF SEXUAL MATURATION IN THE TELEOST, /XIPHOPHORUS MACULATUS/ (POECILIIDAE); A REVIEW. Ann. Biol. Anim. Biochim. Biophys. 18 (4): 957-962. 1978. SFA 24(1)
[Biol. Dep., Brooklyn Coll. City Univ. N.Y., Brooklyn 11210]

79-000315 Sezaki, K.; Kobayasi, H. COMPARISON OF ERYTHROCYTIC SIZE BETWEEN DIPLOID AND TETRAPLOID IN SPINOUS LOACH, /COBITIS BIWAE/. Bull. Jpn. Soc. Sci. Fish. 44 (8): 851-854. Aug. 1978. SFA 24(1)
[Enoshima Aquarium, Katasekaigan, Fujisawa, Kanagawa Pref. 251, Japan]

79-000316 Simanek, D. E. POPULATION GENETICS AND EVOLUTION IN THE /POECILIA FORMOSA/ COMPLEX (PISCES: POECILIIDAE). Ph.D. dissertation, Yale Univ. 242p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(5): 2133. Nov. 1978. SFA 24(1)

79-000317 Smith, A. C. PATHOLOGY AND BIOCHEMICAL GENETIC VARIATION IN THE MILKFISH, /CHANOS CHANOS/. J. Fish Biol. 13 (2): 173-177. Aug. 1978. SFA 24(1)
[Mar. Pathol. Lab., Oceanic Inst., Makapuu Point, Waimanalo, HI 96795] Milkfish, /Chanos chanos/, were sampled from two geographical areas in the Hawaiian Islands approximately 200 miles apart, from Pearl Harbor on Oahu, and Puako on Hawaii. Differences in the incidence of gastritis, a stomach inflammation, and electrophoretic patterns of nuclear lens proteins from fish of the two areas suggested they were separate populations. Genetically, the pattern frequencies indicated homogeneity in the Pearl Harbor fish and heterogeneity in the Puako fish. The former may be a small population in which homozygousity was produced through genetic drift. The genetic heterogeneity of the Puako fish may indicate a single large population or a mixture of populations. These observations support the hypothesis, previously deduced from field studies, that milkfish have many nearshore spawning areas over a wide geographical range and, therefore, little opportunity for genetic interchange between the fish from widely separated areas. Pearl Harbor fish had the highest incidence of gastritis, which appeared to be due to a combination of polluted water and a possible genetic susceptibility to disease from inbreeding.

79-000318 Stanley, J. G.; Thomas, A. E. ABSENCE OF SEX REVERSAL IN UNISEX GRASS CARP FED METHYLTESTOSTERONE. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 194-199. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish. Allied Aquacult., Auburn Univ. Auburn AL 36830. SFA 24(1)
[Me. Coop. Fish Res. Unit, Univ. Me., Orono 04473] The all-female grass carp (/Ctenopharyngodon idella/) produced by artificial gynogenesis confirmed female homogamety. The effectiveness of sex reversal was tested using lots of gynogenetic offspring, a novel approach to the study of sex reversal. Grass carp fry and fingerlings administered methyltestosterone at the rate of 30 or 60 ug/g in the feed was ineffective in inducing sex transformation; all 350 fish examined were female.

79-000319 Thorgaard, G. H. CHROMOSOME REARRANGEMENTS AND SEX CHROMOSOMES IN THE RAINBOW TROUT AND SOCKEYE SALMON. Ph.D. dissertation, Univ. Wash. 111p. 1977. From Diss. Abstr. Int. B Sci. Eng. 39(3):1128. Sept. 1978. SFA 24(1)

79-000320 Vasiliev, V. P. [CHROMOSOME POLYMORPHISM IN /SPICARA SMARIS/ (PISCES, CENTRACANTHIDAE).] Zool. Zh. 57 (8): 1276-1279. Aug. 1978. In Russian with English summ. SFA 24(1)
[Inst. Biol. South Seas, Acad. Sci. Ukrainian SSR, Sevastopol, USSR]

79-000321 Wheeler, A. HYBRIDS OF BLEAK, /ALBURNUS ALBURNUS/, AND CHUB, /LEUCISCUS CEPHALUS/ IN ENGLISH RIVERS. J. Fish Biol. 13 (4): 467-473. Oct. 1978. SFA 24(1)
[Dep. Zool., Brit. Mus. (Nat. Hist.), London SW7 5BD, England] The occurrence of hybrids between bleak, /Alburnus alburnus/, and chub /Leuciscus cephalus/ is reported from four discrete river systems in England. The hybrids are described and illustrated, and means of identification from the parent species are given. Bleak x chub hybrids appear to be moderately common and on superficial examination resemble the bleak parent species more than the chub.

BEHAVIOR

79-000322 Barkley, R. A.; Neill, W. H.; Gooding, R. M. SKIPJACK TUNA, /KATSUWONUS PELAMIS/, HABITAT BASED ON TEMPERATURE AND OXYGEN REQUIREMENTS. NOAA Fish. Bull. 76 (3): 653-662. July 1978. SFA 24(1)
[NMFS, P.O. Box 3830, Honolulu, HI 96812] The habitat of skipjack tuna, /Katsuwonus pelamis/, has generally been assumed to be the warm surface layers of tropical and subtropical ocean, where most of these fish are seen and caught. But experiments with captive Hawaiian skipjack tuna imply that their habitat is more restricted, with boundaries defined by both temperature and dissolved oxygen. The lower temperature limit appears to be about 18°C. The upper temperature limit apparently varies with size of the fish, from 30°C or more for small individuals to as little as 20°C for the largest. Skipjack tuna also require water with unusually high concentrations of dissolved oxygen, at least 3.0-3.5 ml/l (4-5 ppm), for long-term survival. If our Laboratory findings with captive skipjack tuna accurately define their natural habitat, only the smallest of these animals can inhabit the warm surface waters of the tropics; Those larger than 4-5 kg must inhabit the thermocline. Our hypothesis, which can be tested, explains many features of the known distribution of skipjack tuna in the eastern and central Pacific Ocean.

79-000323 Bodznick, D. CALCIUM ION: AN ODORANT FOR NATURAL WATER DISCRIMINATIONS AND THE MIGRATORY BEHAVIOR OF SOCKEYE SALMON. J. Comp. Physiol. A Sens. Neural Behav. Physiol. 127 (2): 157-166. 1978. SFA 24(1)
[Scripps Inst. Oceanogr., La Jolla, CA 92093] Physiological and behavioral experiments demonstrate an acute sensitivity of the olfactory system of sockeye salmon (/Oncorhynchus nerka/) to calcium ions. Gross-potential (olfactory EEG) responses were reliably elicited by calcium at 5×10^{-6} M (a concentration well below the range found in natural fresh waters) and most animals responded differentially to calcium concentrations throughout the natural water range. Mitral cell

79-000323 CONTINUED
and granule layer cells of the olfactory bulbs responded to concentrations as low as 1 x 10^{-6} M CaCl(2). Responses in each case were ion-specific. In addition, behavioral experiments demonstrated that unconditioned sockeye fry would discriminate between 2 natural waters that differed only in calcium concentration. It is proposed that salmon recognize individual natural waters on the basis of the characteristic combination of odorants present and that calcium is one of these important odorant components. The fact that large synchronous wave EEG responses induced by natural waters following distilled water are largely attributable to the calcium ions present may be important for the interpretation of earlier EEG studies of salmon homing.

79-000324 Bodznick, D. CHARACTERIZATION OF OLFACTORY BULB UNITS OF SOCKEYE SALMON WITH BEHAVIORALLY RELEVANT STIMULI. J. Comp. Physiol. A Sens. Neural Behav. Physiol. 127 (2): 147-155. 1978. SFA 24(1)
[Scripps Inst. Oceanogr., La Jolla, CA 92093]

79-000325 Bodznick, D. WATER SOURCE PREFERENCE AND LAKEWARD MIGRATION OF SOCKEYE SALMON FRY (/ONCORHYNCHUS NERKA/). J. Comp. Physiol. A Sens. Neural Behav. Physiol. 127 (2): 139-146. 1978. SFA 24(1)
[Scripps Inst. Oceanogr., La Jolla, CA 92093] The water source preference behavior of sockeye fry and fingerlings of 2 different populations was observed in a 2-choice Y-trough with Lake Washington water (lake) and well water (non-lake) as the alternate choices. Experiments with fry that had been hatched and reared entirely in either Lake Washington water or well water or had not previously experienced either water source demonstrated that preference behavior was a result of 2 separate factors--an apparently innate preference for lake water as compared to non-lake waters as proposed by Brannon (1972) and an attraction for the recently experienced water source over foreign waters. The strong lake water preference of fry that had recently experienced Lake Washington water was eliminated by olfactory occlusion. Water source preference is believed to play an important role in the guidance of sockeye fry migration from their incubation stream to a nurse lake.

79-000326 Chantrey, D. F. SHORT-TERM CHANGES IN RESPONSIVENESS TO MODELS IN /BETTA SPLENDENS/. Anim. Learn. Behav. 6 (4): 469-471. Nov. 1978. SFA 24(1)
[Univ. Keele, Keele, Staffs. ST5 5BG, England]

79-000327 Dore, F.; Lefebvre, L.; Ducharme, R. THREAT DISPLAY IN /BETTA SPLENDENS/: EFFECTS OF WATER CONDITION AND TYPE OF AGONISTIC STIMULATION. Anim. Behav. 26 (3): 738-745. 1978.
[Ecole Psychol., Pavillon Serv. Agric., Univ. Laval, QU G1K 7P4, Canada]

79-000328 Fine, M. L. SEASONAL AND GEOGRAPHICAL VARIATION OF THE MATING CALL OF THE OYSTER TOADFISH /OPSANUS TAU/ L. Oecologia (Berl.) 36 (1): 45-57. 1978. SFA 24(1)
[Sect. Neurobiol. Behav., Longmuir Lab., Cornell Univ., Ithaca, NY 14853] The boatwhistle, the mating call of the oyster toadfish /Opsanus tau/ L. undergoes a pronounced seasonal cycle. The fundamental frequency increases to a peak early in the summer and then decreases markedly in the middle of July. The call duration decreases coincident with the fundamental frequency. It is hypothesized that these fluctuations are controlled by hormonal factors although

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temperature exerts a direct effect on the fundamental frequency. The fundamental frequency of the boat whistle in early season is higher in southern populations than in northern ones. Part of this increase is attributed to increased temperature of southern waters. Call duration, which is independent of temperature, varies irregularly up and down the coast.

79-000329 Gibson, R. J. THE BEHAVIOR OF JUVENILE ATLANTIC SALMON (/SALMO SALAR/) AND BROOK TROUT (/SALVELINUS FONTINALIS/) WITH REGARD TO TEMPERATURE AND TO WATER VELOCITY. Trans. Am. Fish. Soc. 107 (5): 703-712. Sept. 1978. SFA 24(1)
[MacLaren Marex, Inc., St. John's, NF A1A 2Y4, Canada]

79-000330 Goff, G. P.; Green, J. M. FIELD STUDIES OF THE SENSORY BASIS OF HOMING AND ORIENTATION TO THE HOME SITE IN /ULVARIA SUBBIFURCATA/ (PISCES: STICHAEIDAE). Can. J. Zool. 56 (10): 2220-2224. Oct. 1978. In English with French summ. SFA 24(1)
[Dep. Biol., Memorial Univ., St. John's, NF A1B 3X9, Canada] The roles of olfaction and vision in the homing behavior and orientation to a home site in /Ulvaria subbifurcata/ were investigated. These were examined by studing the home-site fidelity and the homing performance of normal, blind, and anosmic fish and the orientation to the home site of normal and sensory-impaired fish. The orientation and homing experiments indicated that olfactory contact with the home site is involved in the steering mechanism in homing. The home-site fidelity of anosmic fish, and the fact that some anosmic fish homed, indicated that vison may also be involved in the recognition of a restricted area around the home site.

79-000331 Haaker, P. L. OBSERVATIONS OF AGONISTIC BEHAVIOR IN THE TREEFISH, /SEBASTES SERRICEPS/ (SCORPAENIDAE). Calif. Fish Game 64 (3): 227-228. July 1978. SFA 24(1)
[Calif. Dep. Fish Game, 350 Golden Gate Shore, Long Beach 90802]

79-000332 Hackney, P. A.; Linkous, T. E. STRIKING BEHAVIOR OF THE LARGEMOUTH BASS AND USE OF THE BINOMIAL DISTRIBUTION FOR ITS ANALYSIS. Trans. Am. Fish. Soc. 107 (5): 682-688. Sept. 1978. SFA 24(1)
[TVA, Norris, TN 37828]

79-000333 Hall, L. W., Jr.; Hocutt, C. H.; Stauffer, J. R., Jr. IMPLICATION OF GEOGRAPHIC LOCATION ON TEMPERATURE PREFERENCE OF WHITE PERCH, /MORONE AMERICANA/. J. Fish. Res. Board Can. 35 (11): 1464-1468. Nov. 1978. In English with French summ. SFA 24(1)
[Acad. Nat. Sci. Phila., Benedict Estuarine Res. Lab., Benedict, MD 20612]

79-000334 Heymer, A.; Zander, C.-D. MORPHOLOGY AND ECOLGY OF /GOBIUS VITTATUS/ VINCIGUERRA, 1883, AND ITS POSSIBLE MIMICRY RELATIONSHIP TO /BLENNIUS ROUXI/ COCCO, 1833 IN THE MEDITERRANEAN. Z. Zool. Syst. Evolutionsforsch. 16 (2): 132-143. Aug. 1978. In English with French and German summ. SFA 24(1)
[CNRS, Lab. Ecol. Gen., F-91800 Brunoy, France]

79-000335 Kodric-Brown, A. ESTABLISHMENT AND DEFENCE OF BREEDING TERRITORIES IN A PUPFISH (CYPRINODONTIDAE: /CYPRINODON/). Anim. Behav. 26 (3): 818-834. Aug. 1978. SFA 24(1)
[Dep. Ecol. Evol. Biol., Univ. Ariz., Tucson 85721] Males of pupfish /Cyprinodon/ sp. established breeding territories on substrates that provided topographic diversity. Territories in optimal breeding habitat were smaller, overlapped less with adjacent territories, and were defended by larger males than those in marginal habitats. In optimal habitats males defended boundaries effciently by threat displays, and spent most of their time in the centre of the territories, whereas in marginal habitat males engaged more frequently in overt aggression and spent less time near the centre of their territories. When objects suitalbe for defence were introduced, territories were established rapidly, and their configuration was determined by the topography of the object.

79-000336 Kratochvil, H. DER BAU DES LAUTAPPARATES VOM KNURRENDEN GURAMI (/TRICHOPSIS VITTATUS/ CUVIER & VALENCIENNES) (ANABANTIDAE, BELONTIIDAE). [STRUCTURE OF THE SOUND PRODUCING ORGAN OF THE CROAKING GOURAMI (/TRICHOPSIS VITTATUS/ CUVIER & VALENCIENNES) (ANABANTIDAE, BELONTIIDAE).] Zoomorphologie 91 (1): 91-99. 1978. In German with English summ. SFA 24(1)
[Zool. Inst. Univ. Wien, Dr. Karl Lueger-Ring 3, A-1010 Wien, Austria]

79-000337 Kwain, W.; McCauley, r. W. EFFECTS OF AGE AND OVERHEAD ILLUMINATION ON TEMPERATURES PREFERRED BY UNDERYEARLING RAINBOW TROUT, /SALMO GAIRDNERI/, IN A VERTICAL TEMPERATURE GRADIENT. J. Fish. Res. Board Can. 35 (11): 1430-1433. Nov. 1978. In English with French summ. SFA 24(1)
[Fish. Wildl. Br., Ontario Minist. Nat. Resour., Sault Ste. Marie, ON, Canada]

79-000338 McNeish, J. D.; Hatch, R. W. STAMINA TUNNEL TESTS ON HATCHERY-REARED ATLANTIC SALMON. Prog. Fish-Cult. 40 (3): 116-117. July 1978. SFA 24(1)
[Me. Dep. Inland Fish. Wildl., Machias 04654]

79-000339 Olofsson, S.; Lindahl, P. E. STUDIES OF FORCE ACTING ON FISH IN THE ROTATORY FLOW APPARATUS. Hydrobiologia 60 (2): 99-108. 18 Aug. 1978. SFA 24(1)
[Inst. Zoolphysiol., Univ. Uppsala, Sweden]

79-000340 Olson, R. D.; Kastin, A. J.; Michell, G. F.; Olson, G. A.; Coy, D. H.; Montalbano, D. M. EFFECTS OF ENDORPHIN AND ENKEPHALIN ANALOGS ON FEAR HABITUATION IN GOLDFISH. Pharmacol. Biochem. Behav. 9 (1): 111-114. July 1978. SFA 24(1)
[Dep. Psychol., Univ. New Orleans, New Orleans, LA 70122]

79-000341 Ordzie, C. J. HABITAT SELECTION BY /FUNDULUS HETEROCLITUS/. Ph.D. dissertation, Univ. R.I. 114p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(5):2113. Nov. 1978. SFA 24(1)

79-000342 Pearcy, W. G. DISTRIBUTION AND ABUNDANCE OF SMALL FLATFISHES AND OTHER DEMERSAL FISHES IN A REGION OF DIVERSE SEDIMENTS AND BATHYMETRY OFF OREGON. NOAA Fish. Bull. 76 (3): 629-640. July 1978. SFA 24(1)
[Sch. Oceanogr., Org. State Univ., Corvallis 97331]

79-000343 Preston, J. L. COMMUNICATION SYSTEMS AND SOCIAL INTERACTIONS IN A GOBY-SHRIMP SYMBIOSIS. Anim. Behav. 26 (3): 791-802. Aug. 1978. SFA 24(1)
[27 Pioneer Village, Philomath, OR 97370]

79-000344 Reutter, K. TASTE ORGAN IN THE BULLHEAD (TELEOSTEI). Adv. Anat. Embryol. Cell. Biol. 55 (1): 1-98. 1978. SFA 24(1)
[Anat. Inst., Univ. Tubingen, Osterbergstrasse 3, 7400 Tubingen, West Germany]

79-000345 Sale, P. F. CHANCE PATTERNS OF DEMOGRAPHIC CHANGE IN POPULATIONS OF TERRITORIAL FISH IN CORAL RUBBLE PATCHES AT HERON REEF. J. Exp. Mar. Biol. Ecol. 34 (3): 233-243. Oct. 1978. SFA 24(1)
[Sch. Biol. Sci., Univ. Sydney, Sydney, N.S.W., Australia]

79-000346 Savchenko, N. V. THE LOCOMOTER ACTIVITY OF FISHES IN RELATION TO ILLUMINATION. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (6): 969-973. 1977. SFA 24(1)
[VNIRO, Moscow, USSR] The manifestation of a locomotor activity rhythm in the annular bream, the sole and the scorpionfish is affected by the intra-group, feeding and defensive behavior of the fish and is related to the illumination level. The activity rhythm disappears with constant illumination. The activity level is manifested with constant illumination at the same values. Light is a signal factor in the manifestation of locomotor activity in fishes, and its influence may possibly not merely be dependent on the time of day, but be governed by its intensity.--Concl.

79-000347 Sbikin, Yu. N. CHANGES IN THE BEHAVIOR OF SOME FISH FROM THE CUBAN SHELF DURING MORNING AND EVENING TWILIGHT. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (5): 785-790. 1978. SFA 24(1)
[A.N. Severtsov Inst. Evol. Morphol. Anim. Ecol., USSR Acad. Sci., Moscow, USSR] Data on the daily rhythm of changes in the behavior of fish from the coral reefs are given. Several groups of fishes are distinguished: diurnal and twilight-nocturnal fish which live constantly on the reef and fish which are found there only at a given time of day. It is shown that the clearly expressed difference in the peculiarities of behavior of these fish at different times of the day confirms the stability of the fish fauna of the reefs and ensures the fuller use of the food and spatial resources available there.

79-000348 Strand, S. W. COMMUNITY STRUCTURE AMONG REEF FISH IN THE GULF OF CALIFORNIA: THE USE OF REEF SPACE AND INTERSPECIFIC FORAGING ASSOCIATIONS. Ph.D. dissertation, Univ. Calif. (Davis) 153p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(3):1117. Sept. 1978. SFA 24(1)

79-000349 Suzuki, N. EFFECTS OF DIFFERENT IONIC ENVIRONMENTS ON THE RESPONSES OF SINGLE OLFACTORY RECEPTORS IN THE LAMPREY. Comp. Biochem. Physiol. A Comp. Physiol. 61 (3): 461-467. 1978. SFA 24(1)
[Zool. Inst., Fac. Sci., Hokkaido Univ., Sapporo 060, Japan]

79-000350 Suzuki, R.; Yamaguchi, M.; Ito, T.; toi, J. CATCHABILITY AND PULLING STRENGTH OF VARIOUS RACES OF THE COMMON CARP CAUGHT BY ANGLING. Bull. Jpn. Soc. Sci. Fish. 44 (7): 715-718. July 1978. SFA 24(1)
[Ueda Br., Freshwater Fish. Res. Lab., Ueda, Nagano Pref., Japan] In order to obtain basic information for genetic improvement of the common carp, /Cyprinus carpio/, differences in catchability and pulling strength in Japanese and European races were studied. The mirror carp was most catchable, the asagi intermediate, and the yamato and the wild carps least catchable. When artificial feed was the bait, all differences between races were significant except that between the yamato and wild carps; the rank was as follows: mirror greater than asagi greater than yamato ± wild. When the bait was earthworms, however, the only significant difference was that between the asagi and wild carps. The mirror carp had the lowest pulling strength, and the scaly German carp was intermediate between that of the mirror and the Japanese carps. Among the Japanese carps the only significant difference was that between the yamato and the asagi carps. These results in pulling strength were the same whether the carps were cultivated in standing- or running-water ponds.

79-000351 Takahashi, T. [THE EFFECTS OF SWEEPING MEMBRANOUS LIGHT ON THE SWIMMING BEHAVIOUR OF FISH.] Bull. Jpn. Soc. Sci. Fish. 44 (8):869-874. Aug. 1978. In Japanese with English summ. SFA 24(1)
[Tokyo Univ. Fish., Minato-ku, Tokyo, Japan]

79-000352 Wainwright, S. A.; Vosburgh, F.; Hebrank, J. H. SHARK SKIN: FUNCTION IN LOCOMOTION. Science 202 (4369): 747-749. 17 Nov. 1978. SFA 24(1)
[Zool. Dep., Duke Univ., Durham, NC 27706] Hydrostatic pressure under the skin of sharks varies with swimming speed. Stress in the skin varies with the internal pressure, and the skin stress controls skin stiffness. Locomotory muscles attach to the skin which is thus a whole-body exotendon whose mechanical advantage in transmitting muscular contraction is greater than that of the endoskeleton.

79-000353 Webb, P. W. TEMPERATURE EFFECTS ON ACCELERATION OF RAINBOW TROUT, /SALMO GAIRDNERI/. J. Fish. Res. Board Can. 35 (11): 1417-1422. Nov. 1978. In English with French summ. SFA 24(1)
[Sch. Nat. Resour., Univ. Mich., Ann Arbor 48109]

79-000354 Williams, A. H. ECOLOGY OF THREESPOT DAMSELFISH: SOCIAL ORGANIZATION, AGE STRUCTURE, AND POPULATION STABILITY. J. Exp. Mar. Biol. Ecol. 34 (3): 197-213. Oct. 1978. SFA 24(1)

[Duke Univ. Mar. Lab., Beaufort, NC] The threespot damselfish, /Eupomacentrus planifrons/ Cuvier, population in the back reef of Discovery Bay, Jamaica was found to be positively correlated with the size of /Acropora cervicornis/ Lamarck patches. Densities of these damselfish, however, were negatively correlated with patch size indicating an instraspecific territorial spacing mechanism on larger patches with contiguous territories. Male threespots competitively exclude smaller males and dusky damselfish from /A. cervicornis/ patches, while female threespots preferentially select /Montastrea annularis/ (Ellis and Solander) heads for territory sites. Four age classes of threespot damselfish were evident from dissection of individuals. Breeding was on a year-round lunar cycle with females laying clutches within male territories. Experimental removals of threespots indicated that replacements within 48 h were in a hierarchical order: (1) replacements from a non-breeding pool of wanderers, (2) replacements by resident damselfish abandoning their territories, and (3) replacements by dusky and immature threespot damselfish. Reduced aggression and cooperative behavior by threespots within large coral patches imparted a high degree of persistence stability to the population with adjustment stability being from replacement of threespots from the pool of wanderers.

79-000355 Wolf, D. J. GALVANOTROPIC ORIENTATION OF GOLDFISH (/CARASSIUS AURATUS/). Ph.D. dissertation, Univ. Ill. 187p. 1976. From Diss. Abstr. Int. B Sci. Eng. 38(1):99. July 1977. SFA 24(1)

LIFE HISTORIES-GENERAL WORKS

79-000356 Baker, J. R. THE FANTAIL DARTER /ETHEOSTOMA FLABELLARE/ IN THE SALT RIVER DRAINAGE, KENTUCKY. Trans. Ky. Acad. Sci. 39 (3-4): 150-159. Sept. 1978. SFA 24(1)

[Dep. Biol. Sci., Univ. Nev., Las Vegas 89154] Age and growth, length-weight relationship, coefficient of conditon, food habits, sex ratios, and a maturity index were determined for the fantail darter /Etheostoma flabellare/ in Brashears Creek, a tributary to the Salt River in Spencer and Shelby counties, Kentucky. Comparisons were made with other fantail darters collected throughout the Salt River Basin. Life span was approximately 2.5 years for males and 2 years for females. Growth was greatest in the first year from June through October. Coefficient of condition was highest in July and lowest in November. Food consisted of Diptera, Ephemeroptera, Tricoptera, Plecoptera, and other invertebrates in order of importance. Males were more numerous than females due to a differential mortality rate. The maturity index for females was highest in April when the ovary weight was 15.5 percent of the body weight.

79-000357 Brazo, D. C.; Liston, C. R.; Anderson, R. C. LIFE HISTORY OF THE LONGNOSE DACE, /RHINICHTHYS CATARACTAE/, IN THE SURGE ZONE OF EASTERN LAKE MICHIGAN NEAR LUDINGTON, MICHIGAN. Trans. Am. Fish. Soc. 107 (4): 550-556. July 1978. SFA 24(1)

[Great Lakes Res. Lab., Dep. Fish. Wildl., Mich. State Univ., Ludington, MI 49431]

79-000358 Burr, B. M.; Page, L. M. THE LIFE HISTORY OF THE CYPRESS DARTER, /ETHEOSTOMA PROELIARE/, IN MAX CREEK, ILLINOIS. Ill. Nat. Hist. Surv. Biol. Notes No. 106. 15p. July 1978. SFA 24(1)
[Dep. Zool., South. Ill. Univ., Carbondale]

79-000359 Chapman, D. W.; van Well, P. OBSERVATIONS ON THE BIOLOGY OF /LUCIOLATES STAPPERSI/ IN LAKE TANGANYIKA (TANZANIA). Trans. Am. Fish. Soc. 107 (4): 567-573. July 1978. SFA 24(1)
[P.O. Box 1362, McCall, Idaho 83638]

79-000360 Colin, P. L.; Arneson, D. W. ASPECTS OF THE NATURAL HISTORY OF THE SWORDTAIL JAWFISH, /LONCHOPISTHUS MICROGNATHUS/ (POEY) (PISCES: OPISTOGNATHIDAE), IN SOUTH-WESTERN PUERTO RICO. J. Nat. Hist. 12 (6): 689-697. Nov.-Dec. 1978. SFA 24(1)
[Dep. Mar. Sci., Univ. Puerto Rico, Mayaguez 00708]

79-000361 Colle, D. E.; Shireman, J. V.; Manuel, D. K. AGE, GROWTH, CONDITION AND FOOD HABITS OF LARGEMOUTH BASS COLLECTED FROM A LOUISIANA COASTAL FRESHWATER MARSH. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 259-268. 1976[1978]. SFA 24(1)
[Univ. Southwest. La., Lafayette 70501] A total of 710 largemouth bass was collected from a 4047 ha coastal freshwater marsh in Southwestern Louisiana. Seven age-groups (0-VII) were present in the marsh. Annual increments were smaller for the first 3 years of life when compared to other Louisiana areas, but greater during the remainder of life. Condition factors were comparable to these obtained by other Louisiana authors. Food habits of young-of-the-year bass greater than 95 mm in length were not different from age groups I and II. Fish and adult odonates were the principal forage for bass in the summer. During the winter, stomachs of bass from age groups 0-II contained principally fish and freshwater shrimp whereas those from age groups ≥ III contained predominantly fish.

79-000362 Druzhinin, A. D. SOME DATA ON THE SPOTTED DREPANE (/DREPANE PUNCTATA/) OF THE ANDAMAN AND ARABIAN SEAS. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (6): 945-950. 1977. SFA 24(1)
[VNIRO, Moscow, USSR] The drepane lives at slight depths (less than 100 m) and, to judge by catches, does not form large schools. The fish found in the central part of the Andaman Sea over muddy and muddy-sandy bottoms are mainly small. Predominantly large drepane live at the entrance to the Gulf of Aden in the Cape Fartak area over sandy, sandy-shelly and sandy-muddy bottoms. The drepane from the Cape Fartak area is in better condition and has greater mean weight (by size groups) than the drepane from the Tavoy Island area. The drepane caught in the Cape Fartak area were between 2+ and 8+, with fish of 5+; 6 and 6+; 7 predominating. The drepane feeds on worms, bivalves and cephalopods, crustaceans and fishes.--Concl.

79-000363 Eddy, S. B.; Lankester, M. W. FEEDING AND MIGRATORY HABITS OF ARCTIC CHAR, /SALVELINUS ALPINUS/, INDICATED BY THE PRESENCE OF THE SWIMBLADDER NEMATODE /CYSTIDICOLA CRISTIVOMERI/ WHITE. J. Fish. Res. Board Can. 35 (11): 1488-1491. Nov. 1978. In English with French summ. SFA 24(1)
[Fish. Mar. Serv., Biol. Stn., St. Andrews, NB E0G 2X0, Canada]

79-000364 Ellis, C. M. A. BIOLOGY OF /LUCIOLATES STAPPERSI/ IN LAKE TANGANYIKA (BURUNDI). Trans. Am. Fish. Soc. 107 (4): 557-566. July 1978. SFA 24(1)
[Casilla 28, Tingo Maria, Peru]

79-000365 Fahay, M. P. BIOLOGICAL AND FISHERIES DATA ON AMERICAN EEL, /ANGUILLA ROSTRATA/ (LASUEUR). Sandy Hook Lab. Tech. Ser. Rep. No. 17. ix + 84p. Aug. 1978. SFA 24(1)
[NMFS, Sandy Hook Lab., Highlands, NJ]

79-000366 Gaygalas, K. S. MORPHO-ECOLOGICAL CHARACTERISTICS AND ECONOMIC IMPORTANCE OF THE ASP (/ASPIUS ASPIUS/) IN THE BASIN OF THE KURSHYU MARES (COURIAND LAGOON). J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (6): 856-863. 1977. SFA 24(1)
[Inst. Zool. Parasitol., Lithuanian Acad. Sci., Vilnius, USSR] Data are given on the morphology, range, growth, population structure, catches, state of stocks and fishery of the asp (/Aspius aspius/) in the basin of the Kurshyu Mares. If the size of the stock is to be increased the asp must be included among the protected species, a minimum commercial size of 40 cm must be established and the economically unprofitable fishing in the spawning period must be discontinued.

79-000367 Gwahaba, J. J. THE BIOLOGY OF CICHLID FISHES (TELEOSTEI) IN AN EQUATORIAL LAKE (LAKE GEORGE, UGANDA). Arch. Hydrobiol. 83 (4): 538-551. 1978. SFA 24(1)
[Dep. Zool., Makerere Univ., P.O. Box 7062, Kampala, Uganda]

79-000368 Hasse, J. J.; Madraisau, B. B.; McVey, J. P. SOME ASPECTS OF THE LIFE HISTORY OF /SIGANUS CANALICULATUS/ (PARK) (PISCES: SIGANIDAE) IN PALAU. Micronesica 13 (2): 297-312. Dec. 1977. SFA 24(1)
[NYSDEC, Box 57, Avon, NY 14414]

79-000369 Healey, M. C. THE DISTRIBUTION, ABUNDANCE, AND FEEDING HABITS OF JUVENILE PACIFIC SALMON IN GEORGIA STRAIT, BRITISH COLUMBIA. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 788. v + 49p. June 1978. In English with French summ. SFA 24(1)
[Fish. Mar. Serv., Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada] From spring to late summer all species of Pacific salmon occurred throughout the strait, but in winter only chinook and coho were common. Within each region of the strait there were areas of local concentration of young salmon and these showed some constancy from year to year. Coho and chinook tended to be segregated within each region of the strait as well as between regions. Length-frequency distribution suggested that young salmon residing in the North Strait were larger than those residing in the South Strait. All species except sockeye appeared to grow significantly during their residence in the strait. Sockeye appeared to move rather quickly through the strait except for a group of sockeye which apparently migrated as fry. Chum and, especially, chinook showed complicated length frequency distributions suggesting the presence of two or more age classes or ecological types. The diets of all 5 species were dominated by fish, crab larvae, amphipods, and euphausiids, but in different proportions. Coho and chinook were most dependent on fish while the other species concentrated on invertebrates. Diet differed in different regions of the strait and appeared to reflect a combination of food preferences and availability. The abundance of chinook, coho, and chum was

79-000369 CONTINUED
positively correlated with the amount in their stomachs between regions of the strait and between years. This suggests that the young salmon congregate in the best feeding areas and may leave the strait if feeding conditions are poor.--from abstr.

79-000370 Kiefling, J. W. STUDIES ON THE ECOLOGY OF THE SNAKE RIVER CUTTHROAT TROUT. Wyo. Game Fish Dep. Fish. Tech. Bull. No. 3. xi + 198p. 1978. SFA 24(1)
[Wyo. Game Fish Dep., Jackson]

79-000371 Manooch, C. S. III; Hassler, W. W. SYNOPSIS OF BIOLOGICAL DATA ON THE RED PORGY, /PAGRUS PAGRUS/ (LINNAEUS). NOAA Tech. Rep. NMFS Circ. 412. iii + 19p. May 1978. SFA 24(1)
[NMFS, Beaufort, NC 28516] A synopsis of the biology of the red porgy, /Pagrus pagrus/, that includes taxonomy, morphology, distribution, aspects of the life history, behavior, and abundance. Also included are: discussions of commercial and recreational fishing methods and fishing grounds, and size, age, and sex composition of the recreational catch off North Carolina and South Carolina and commercial catch off Argentina.

79-000372 Matthew, W. J.; Shepard, W. D.; Hill, L. G. ASPECTS OF THE ECOLOGY OF THE DUSKYSTRIPE SHINER, /NOTROPIS PILSBRYI/ (CYPRINIFORMES, CYPRINIDAE), IN AN OZARK STREAM. Am. Midl. Nat. 100 (1): 247-252. July 1978. SFA 24(1)
[Dep. Biol., Roanoke Coll., Salem, VA 24153] The food habits, population structure and distribution of /Notropis pilsbryi/ were studied in Piney Creek, Izard Co., Arkansas. Food items commonly used included larval aquatic insects and drift items of terrestrial origin. Many of the stomachs also contained algae. Stomachs were relatively full from 0600 to 2400 hr; no bimodal peak of feeding was noted. Populations were dominated by age 0 and I fish, but some individuals were in their 4th year. The duskystripe shiner was most common at downstream stations in the watershed; numbers of individuals and percent of /N. pilsbryi/ per collection were correlated very significantly with stream order. Mean weight of individuals exhibited a negative correlation with stream order.

79-000373 Mercer, L. P. THE REPRODUCTIVE BIOLOGY AND POPULATION DYNAMICS OF BLACK SEA BASS, /CENTROPRISTIS STRIATA/. Ph.D. dissertation, Coll. William and Mary in Va. 211p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(5):2067. Nov. 1978. SFA 24(1)

79-000374 Savvaitova, K. A.; Medvedeva, Ye. D.; Maksimov, V. A. THE DEEPWATER CHAR (/SALVELINUS/, SALMONIDAE, SALMONIFORMES) OF THE NORIL'SK LAKES. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (6): 835-850. 1977. SFA 24(1)
[Dep. Ichthyol., Moscow Univ., Moscow, USSR]

79-000375 Starnes, W. C. THE ECOLOGY AND LIFE HISTORY OF THE ENDANGERED SNAIL DARTER, /PERCINA (IMOSTOMA) TANASI/ ETNIER. Ph.D. dissertation, Univ. Tenn. 154p. 1977. From Diss. Abstr. Int. B Sci. Eng. 38(2):491. Aug. 1977. SFA 24(1)

A 2-year study of the ecology and life history of the snail darter, /Percina tanasi/, was conducted from 1974 to 1976. The snail darter was found to be a strictly benthic species principally associated with a large river gravel shoal habitat where it feeds and reproduces. Its present range is restricted to the lower Little Tennessee River and a small adjacent portion of the Tennesse River. It is speculated that /P. tanasi/ once occupied a much wider range in the upper Tennessee River drainage which has since been curtailed by impoundments. This species was found to be a short-lived darter which, along with other members of the subgenus /Imostoma/, spawns in mid-winter. Iarval drift is a significant event in the life of the snail darter, and early development is very slow. Adults are migratory, especially during the breeding season. The principal diet constituents are gastropods; there is some utilization of insects. A high degree of selectivity is exercised in procuring the gastropod diet, and there are seasonal trends in both diet composition and consumption levels. /P. tanasi/ occupies a remote position in the Little Tennessee food web. Predation is thought to be high on the eggs and larval stages of /P. tanasi/ but low on adults. Parasitism is very low. The present ecological situation of the snail darter is thought to be considerably altered from that of preimpoundment days. It is threatened with extinction if the remainder of its habitat in inundated by the Tellico Dam.

79-000376 Stasiak, R. H. REPRODUCTION, AGE, AND GROWTH OF THE FINESCALE DACE, /CHROSOMUS NEOGAEUS/, IN MINNESOTA. Trans. Am. Fish. Soc. 107 (5): 720-723. Sept. 1978. SFA 24(1)

[Dep. Biol., Univ. Nebr., Omaha 68182]

79-000377 Sturm, M. G. de L. ASPECTS OF THE BIOLOGY OF /SCOMBEROMORUS MACULATUS/ (MITCHILL) IN TRINIDAD. J. Fish Biol. 13 (2): 155-172. Aug. 1978. SFA 24(1)

[Dep. Biol. Sci., Bayero Univ., P.M.B. 3011, Kano, Nigeria] A study was made of the biology of /S. maculatus/. Results of gonadal examination of 347 males and 409 females suggest spawning takes place from October to April, a period associated with low salinities. First spawning takes place at ages II and/or III for both sexes. Sex ratio results suggest spawning may be promiscuous, males outnumbering females. Egg counts from 12 ripe females ranged from 26,057 to 149, 736. A period of abundance from May to September may be associated with a post-spawning feeding migration encompassing the island, possibly in a clockwise direction. Otoliths were used to age 817 fish. Opaque and translucent rings are formed yearly. The translucent ring, representing a period of slow growth, is laid down during the spawning season. The fish can live for nine years with females growing faster than males. Growth parameters are compared with those obtained for Brazilian and Florida fish. Mortality rates were investigated and gill nets effected higher mortaility rates than beach seines. Full recruitment takes place at age III for gill nets, and ages II and III for beach seines.

79-000378 Wiley, J. W. LIFE HISTORIES AND SYSTEMATICS OF THE WESTERN NORTH AMERICAN GOBIES /LYTHRYPNUS DALLI/ (GILBERT) AND /LYTHRYPNUS ZEBRA/ (GILBERT). Trans. San Diego Soc. Nat. Hist. 18 (10): 169-184. 5 Oct. 1976. SFA 24(1)
[U.S. For. Serv., P.O. Box 21, Palmer, Puerto Rico 00721]

POPULATION STUDIES, PRODUCTION, ETC.

79-000379 Birman, I. B. INTRAPOPULATION GROUPINGS OF THE AMUR AUTUMN CHUM SALMON, /ONCORHYNCHUS KETA/. J. Ichthycl. (Engl. Transl. Vopr. Ikhtiol.) 17 (5): 741-750. 1978. SFA 24(1)
[KoTINRO, Petropavlovsk-Kamchatskiy, USSR] The nature and adaptive value of the biological groupings of the Amur autumn chum salmon, /Oncorhynchus keta/, which are distinguished during the time of its spawning run in the Amur estuary were investigated.

79-000380 Colle, D. E.; Shireman, J. V.; Gasaway, R. D.; Stetler, R. L.; Haller, W. T. UTILIZATION OF SELECTIVE REMOVAL OF GRASS CARP (/CTENOPHARYNGODON IDELLA/) FROM AN 80-HECTARE FLORIDA LAKE TO OBTAIN A POPULATION ESTIMATE. Trans. Am. Fish. Soc. 107 (5): 724-729. Sept. 1978. SFA 24(1)
[Sch. For. Resour. Conserv., Univ. Fla., Gainesville 32611]

79-000381 Fiedler, P. C. THE PRECISION OF SIMULATED TRANSECT SURVEYS OF NORTHERN ANCHOVY, /ENGRAULIS MORDAX/, SCHOOL GROUPS. NOAA Fish. Bull. 76 (3): 679-685. July 1978. SFA 24(1)
[Scripps Inst. Oceanogr., Univ. Calif., La Jolla 92093]

79-000382 Fujioka, J. T. A SIMULATION STUDY OF DOGFISH SHARK POPULATIONS (/SQUALUS ACANTHIAS/) IN PUGET SOUND. Ph.D. dissertation, Univ. Wash. 118p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(5): 2074. Nov. 1978. SFA 24(1)

79-000383 Gasaway, R. D. GROWTH, SURVIVAL AND HARVEST OF GRASS CARP IN FLORIDA LAKES. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 167-184. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish. Allied Aquacult., Auburn Univ. Auburn, AL 36830. SFA 24(1)
[Fla. Game Fresh Water Fish Comm., Lake Wales 33853] Grass carp growth, survival and harvest in six Florida lakes were examined. Standing crops ranged from 3.3 kg/ha to 356 kg/ha in lakes studied. Growth rates and yields seemed to be influenced by habitat conditions and predation. Stocked grass carp displayed linear growth over the study period in two lakes where hydrilla (/Hydrilla verticillata/) remained the dominant plant. Individual growth rates as high as 5.8 kg/year were recorded. Data from Lake Wales were analyzed using multiple linear regression to mathematically define the influence of grass carp and other factors associated with abundance of hydrilla. Hypothetical stocking densities of grass carp needed to remove hydrilla were calculated using the regression equation.

79-000384 Gee, A. S.; Milner, N. J.; Hemsworth, R. J. THE PRODUCTION OF JUVENILE ATLANTIC SALMON, /SALMO SALAR/ IN THE UPPER WYE, WALES. J. Fish Biol. 13 (4): 439-451. Oct. 1978. SFA 24(1)

[Univ. Wales Inst. Sci. Technol., Field Cent., Newbridge-on-Wye, Powys, Wales] The production of juvenile Atlantic salmon (/Salmo salar/ L.) was investigated in 16 study sites in the upper Wye catchment during the period February 1975 to November 1976. The population structure was characterised by large numbers of 0+ fish whose abundance decreased with respect to time so that the numbers of each of the older year-classes was a function of the year-class strength of the original fry. The range of parr densities was similar to that recorded for other rivers: the estimates of 2+ smolts did not exceed about 0.04 m^{-2}. Production ranged from 0.3 to 11.0 g $m^{-2}a^{-1}$; 0+ and 1+ fish contributed over 72 percent and 3+ fish less than 1 percent of the total annual production. The relationship between production P (g $m^{-2}a^{-1}$) and mean biomass B (g m^{-2}) for all year-classes considered separately and in combination can be expressed by the relationship $P=aB$ to the b. The values for a vary with age-composition and season but the values for b are not significantly different. differences in growth rate of salmon between sites are small and differences in production result principally from differences in standing crop (biomass density). In most cases low values for salmon production can be attributed to poor spawning.

79-000385 Goldspink, C. R. THE POPULATION DENSITY, GROWTH RATE AND PRODUCTION OF BREAM, /ABRAMIS BRAMA/, IN TJEUKEMEER, THE NETHERLANDS. J. Fish Biol. 13 (4): 499-517. Oct. 1978. SFA 24(1)

[Dep. Biol. Sci., Manchester Polytech., England] A method of estimating the popualtion density of bream in Tjeukemeer (21.3 km^2) using 16,690 introduced fish (fin-clipped and opercular tagged) is described. Gill nets of the winter fishery proved to be a more effective method of sampling the population for marked fish than fyke nets. The population density of bream (greater than or equal to 25 cm) was estimated to be 180,000. There was no significant difference between the estimates derived from fin-clipped and opercular tagged fish. The growth rate of bream in Tjeukemeer is poor compared with that of bream in other waters, due to its high density and the scarcity of zoobenthos available to it. The production of bream (I-XV) is estimated to be 34 kg ha^{-1} of which 25 percent is contributed by two (1959, 1963) strong year classes. Of a total biomass of 37.5 kg ha^{-1} available to the fishery in 1969 only 2.7 kg ha^{-1} was removed as yield. The average P/B ratio for the population was low (0.39). It is concluded that a major flow of energy to bream is through zooplankton.

79-000386 Grinstead, B. G.; Gennings, R. M.; Hooper, G. R.; Schultz, C. A.; Whorton, D. A. ESTIMATION OF STANDING CROP OF FISHES IN THE PREDATOR-STOCKING-EVALUATION RESERVOIRS. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 120-130. 1976[1978]. SFA 24(1)

[TVA, Norris, TN] The cove rotenone sample Technique was used to estimate standing crop of fishes in the 23 reservoirs selected for the Predator Stocking Evaluation (PSE). Estimates of adjusted standing crops were derived by expanding the observed standing crop of fish in a cove sample by compensation factors for incomplete recovery of fish in the sample and for different shoreline-open water distributional patterns of various fish species and size groups. Results of 138 rotenone samples indicated that the mean adjusted standing crop of fishes in the PSE reservoirs was 451.1 pounds per acre, an increase of 79 percent over unadjusted crop. Adjusted crop estimates of major taxa in pounds per acre were: /Esox/ sp., 0.8; white bass, 3.7; striped bass, 0.6; black bass, 30.2; crappie, 17.8; walleye, 0.4; gars, 2.5; bowfin, 3.3; catfish, 39.2; clupeids, 148.3; minnows and silversides,

79-000386 CONTINUED
3.1; white perch and yellow bass, 1.1; sunfishes, 82.2; darters, 1.7; yellow perch, 6.8; carp and goldfish, 43.1; catostomids, 48.7; drum, 18.7. These data were utilized in other segments of the Predator Stocking Evaluation to establish correlations with environmental factors and to describe predator/prey relationships.

79-000387 Hourston, A. S. THE DECLINE AND RECOVERY OF CANADA'S PACIFIC HERRING STOCKS. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 784. v + 17p. June 1978. In English with French summ. SFA 24(1)
[Fish. Mar. Serv., Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada] Prior to the 1960's, the catch of herring from the nine major stocks was limited primarily by the available markets and catching and processing capacity. Apparent annual mortality rates of 75 percent to over 90 percent in the 1950's did not depress the abundance of the stocks. In the mid-1960's, eight of nine stocks experienced poor recruitment in 3 out of 4 yr and abundance dropped. With better vessels and new technology, fishermen were able to maintain catches of close to former levels for 2 or 3 yr until rather gross stock assessment procedures were able to demonstrate that stocks had been reduced to a fraction of their former level. Because the next two year-classes to be recruited had already been depleted when the fishery was closed, spawn deposition remained at a low level for 4 yr before showing an improvement in the 5th yr and recovery in the 6th yr. The timing of the decline varied between stocks over a period of 5 yr and, because the populations are made up of a mixture of stocks, the low period extended from between 5 and 10 yr for different populations. Two of the populations have not yet recovered to their former strength. The establishment of procedures for more precise monitoring of the stocks and of management strategies based on achieving optimum escapements should preclude a repeat of the 1960's for Canada's west coast herring stocks.

79-000388 Jensen, A. L. ASSESSMENT OF THE LAKE TROUT FISHERY IN LAKE SUPERIOR: 1929-1950. Trans. Am. Fish. Soc. 107 (4): 543-549. July 1978. SFA 24(1)
[Sch. Nat. Resour., Univ. Mich., Ann Arbor 48109]

79-000389 Kazanskiy, A. B. A MATHEMATICAL MODEL OF THE BLUE BREAM (/ABRAMIS BALLERUS/) POPULATION OF TSIMLYANSK RESERVOIR. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (6): 864-872. 1977. SFA 24(1)
[Biol. Inst., Leningrad Univ., USSR] A mathematical computer model is proposed for the population dynamics and growth rate of the blue bream (/Abramis ballerus/) population of the Tsimlyansk reservoir. Some means of allowing for the influence of the main non-regular factors on the reproduction and survival of juveniles by the parameters of the reproduction curve are investigated in the model.

79-000390 Kirka, A. POPULACIA PSTRUHA POTOCNEHO /SALMO TRUTTA MORPHA FARIO/ L. V RIECKE JELESNI. [DISTRIBUTION OF TROUT (/SALMO TRUTTA MORPHA FARIO/ L.) IN THE RIVULET JELESNA.] Biol. Pr. 20 (3): 1-53. 1974. In Czech with English, Russian and German summ. SFA 24(1)

79-000391 Langford, F. H.; Ware, F. J.; Gasaway, R. D. STATUS AND HARVEST OF INTRODUCED /TILAPIA AUREA/ IN FLORIDA LAKES. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 102-108. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36830. SFA 24(1)

[Fla. Game Fresh Water Fish Comm., Lake Wales 33853] Spread and reproduction of three thousand /Tilapia aurea/ originally stocked in 1961 has led to the species becoming the dominant fish in several central Florida lakes. Standing crop, habitat preference and changes in some associated fish species as well as data from seine haul catches are reported. Execution, implementation and economics of a continuing five-year-old commercial fishing program are discussed. Catches in six lakes with emphasis on Lakes Parker, Lulu, Banana, Effie, Hancock and Hollingsworth are presented. Total yield for the five-year program was estimated to be 1,257,732 kg of tilapia by haul seines. Current research needs are discussed.

79-000392 Meyer, D. W. THE RELATIONSHIP BETWEEN PRIMARY PRODUCTION AND FISH PRODUCTION. M.S. thesis, Colo. State Univ. 1978. SFA 24(1)

The relationship between gross photosynthesis and production of fish with different food preferences was studied in eight swimming pool microcosms stocked with smallmouth bass fry or carp fry, as well as in a 0.52 ha pond stocked with pumpkinseed sunfish. Mean gross photosynthesis values for the bass pools and carp pools was 3.44 to 4.48 gO(2) m^{-2} day^{-1} and 3.54 to 4.26 gO(2) m^{-2} day^{-1}, respectively. Production of bass after 115 days was 0.037 to 0.066 g m^{-2} day^{-1}. Production of carp after 114 days was 0.106 to 0.197 g m^{-2} day^{-1}. The ratio of fish production to gross photosynthesis for individiual pools ranged from 0.94 percent to 1.92 percent for bass and from 2.96 percent to 4.75 percent for carp, with means of 1.34 percent and 3.48 percent, respectively. Mean gross photosynthesis for the pond was 7.66 gO(2) m^{-2} day^{-1}, and fish production averaged 0.062 g m^{-2} day^{-1}. The production ratio was 0.81 percent. The different food preferences of the bass and carp were considered to be the reason for the difference between the ratios observed in the bass and carp microcosms. Results from the pond study suggest that the production ratio for a sport fishery will be lower than that observed in microcosms containing fish with similar food preferences. This is because yields from natural systems are usually underestimates of actual production and even greater underestimates of potential production. These underestimates are the result of incomplete harvest, the complexities of natural food webs, and the lower fish population densities which produce the rapid individual growth desired in a sport fishery but sacrifice potential production.--From abstr.

79-000393 Muller, R. G. POPULATION BIOLOGY OF /STOLEPHORUS HETEROLOBUS/ (PISCES: ENGRAULIDAE) IN PALAU, WESTERN CAROLINE ISLANDS. Ph.D. dissertation, Univ. Hawaii 190p. 1976. From Diss. Abstr. Int. B Sci. Eng. 38(1):27. July 1977. SFA 24(1)

79-000394 Murawski, S. A.; Cole, C. F. POPULATION DYNAMICS OF ANADROMOUS RAINBOW SMELT /OSMERUS MORDAX/, IN A MASSACHUSETTS RIVER SYSTEM. Trans. Am. Fish. Soc. 107 (4): 535-542. July 1978. SFA 24(1)
[NMFS, Northeast Fish. Cent., Woods Hole, MA 02543]

79-000395 Perry W. G. STANDING CROPS OF FISHES OF AN ESTUARINE AREA IN SOUTHWEST LOUISIANA. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 71-81. 1976[1978]. SFA 24(1)
[La. Wildl. Fish. Comm., Grand Chenier 70643] Standing crop of estuarine fisheries, as determined by extensive rotenone sampling, ranged from 17.6 to 1,605 kg/ha; overall average was 393.8. The most abundant species in numbers were gulf menhaden, /Brevoortia patronus/ (54.6 percent); anchovies, /Anchoa/ sp. (10.7 percent); and striped mullet, /Mugil cephalus/ (6.6 percent). Of the 8,322 kg of fish collected during the study, red drum, /Sciaenops ocellata/, represented 32.2 percent, followed by menhaden (16 percent) and striped mullet (11.5 percent). First day rotenone samples were not sufficient for quantitating species abundance. Rotenone collections indicated that trawls were highly selective (P less than .01).

79-000396 Rubenstein, D. I. POPULATION DENSITY, RESOURCE PATTERNING, AND MECHANISMS OF COMPETITION IN THE EVERGLADES PYGMY SUNFISH. Ph.D. dissertation, Duke Univ. 165p. 1977. From Diss. Abstr. Int. B Sci. Eng. 39(3):1163. Sept. 1978. SFA 24(1)

79-000397 Shaboneyev, I. Ye.; Ryanzantseva, Ye. I. POPULATION STRUCTURE OF THE OCEANIC HORSEMACKEREL (/TRACHURUS PICTURATUS PICTURATUS/). J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (6): 954-958. 1977. SFA 24(1)
[VNIRO, Moscow, USSR]

79-000398 Summerfelt, R. C.; Shirley, K. E. ENVIRONMENTAL CORRELATES TO YEAR-CLASS STRENGTH OF LARGEMOUTH BASS IN LAKE CARL BLACKWELL. Proc. Okla. Acad. Sci. 58: 54-63. 1978. SFA 24(1)
[Dep. Anim. Ecol., Iowa State Univ., Ames 50011] Estimates of ecological density (number per unit of area of suitable habitat) of young-of-the-year (YOY) largemouth bass were made for 11 consecutive year-classes (1965-75) in Lake Carl Blackwell, a reservoir in which large annual variations in recruitment have been observed. The estimates ranged from 0.13 to 447 YOY bass per hectare (average 121). Significant positive correlations were obtained for the relation between year-class strength and water level, change in water level, and turbidity; significant negative correlations were obtained between year-class strength and water hardness, alkalinity, and pH. The correlations between year-class strength and wind velocity, air and water temperature and number of brood bass were not statistically significant. Strong year-classes developed in years of high water level when conditions simulated those occurring in a newly impounded lake. Water level also affected the physical and chemical composition of the water.

79-000399 Willis, D. W.; Owen, J. B. DECLINE OF YEAR-CLASS STRENGTH OF BUFFALO FISHES IN LAKE SAKAKAWEA, NORTH DAKOTA. Prairie Nat. 10 (3): 89-91. Sept. 1978. SFA 24(1)
[Biol. Dep., Univ. N. Dak. Grand Forks 58202]

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC.

79-000400 Bowering, W. R. FECUNDITY OF WITCH FLOUNDER (/GLYPTOCEPHALUS CYNOGLOSSUS/) FROM ST. PIERRE BANK AND THE GRAND BANK OF NEWFOUNDLAND. J. Fish. Res. Board Can. 35 (9): 1199-1206. Sept. 1978. In English with French summ. SFA 24(1)
[Dep. Fish. Environ., Res. Resour. Serv., St. John's, NF, Canada]

79-000401 Brewer, G. D. REPRODUCTION AND SPAWNING OF THE NORTHERN ANCHOVY, /ENGRAULIS MORDAX/, IN SAN PEDRO BAY, CALIFORNIA. Calif. Fish Game 64 (3): 175-184. July 1978. SFA 24(1)
[Allan Hancock Found., Univ. South. Calif., Los Angeles 90007] The gonosomatic index (GSI) was computed for samples of adult northern anchovy collected from the Los Angeles-Long Beach Habor live-bait fishery during 1973 and 1974. GSI values were highest in February and March of both years and declined to the lowest values in September. The abundance of anchovy eggs and larvae in plankton samples taken from San Pedro Bay during the same period was also highest in February and March and lowest during August and September. Field and laboratory data suggest that within an environmental temperature range of 13 to 18 C (55 to 66 F), northern anchovy have the potential to breed all year, but are constrained to a seasonal reproductive cycle by dietary requirements that exceed available production of zooplankton.

79-000402 Hart, M. 't A STUDY OF A SHORT TERM BEHAVIOUR CYCLE: CREEPING THROUGH IN THE THREE-SPINED STICKLEBACK (/GASTEROSTEUS ACULEATUS/ L.). PART 2.. Behaviour 67 (182): 1-66. 1978. In English with German summ. SFA 24(1)
[Dep. Ethol., Univ. Leiden, The Netherlands]

79-000403 Htun-Han, M. THE REPRODUCTIVE BIOLOGY OF THE DAB /LIMANDA LIMANDA/ (L.) IN THE NORTH SEA: SEASONAL CHANGES IN THE TESTIS. J. Fish Biol. 13 (3): 361-367. Sept. 1978. SFA 24(1)
[Minist. Agric. Fish. Food, Fish Lab., Lowestoft, NR33 0HT, Suffolk, England] Spermatogenesis in the dab is described in five easily identifiable stages: spermatogonium (Stage I), primary spermatocyte (II), secondary spermatocyte (III), spermatid (IV), and spermatozoon (V). The annual reproductive cycle in male dab may be divided into four morphologically and histologically distinct periods: prespawning (September-November), spawning (December-March), postspawning (April-May) and resting (June-August) period.

79-000404 Htun-Han, M. THE REPRODUCTIVE BIOLOGY OF THE DAB /LIMANDA LIMANDA (L.) IN THE NORTH SEA: GONOSOMATIC INDEX, HEPATOSOMATIC INDEX AND CONDITION FACTOR. J. Fish Biol. 13 (3): 369-378. Sept. 1978. SFA 24(1)
[Minist. Agric. Fish. Food, Fish. Lab., Lowestoft, NR33 0HT, Suffolk, England] Measurements have been made of the annual cyclical changes in gonosomatic index (GSI), hepatosomatic index (HSI) and condition factor (K) in male and female dab /Limanda limanda/ (L.). There is a direct correlation between HSI and K, and an inverse

79-000404 CONTINUED
correlation of these factors to GSI but with a three month lag. It was also found that the lower ('ventral') ovaries were invariably heavier than the upper ('dorsal') ovaries at all times, and a similar relationship was found in testes prior to and during the spawning season.

79-000405 Htun-Han, M. THE REPRODUCTIVE BIOLOGY OF THE DAB /LIMANDA LIMANDA/ (L.) IN THE NORTH SEA: SEASONAL CHANGES IN THE OVARY. J. Fish Biol. 13 (3): 351-359. Sept. 1978. SFA 24(1)
[Minist. Agric. Fish. Food, Fish. Lab., Lowestoft, NR33 OHT, Suffolk, England] Oogenesis in the dab is described in six easily identifiable stages: oogonium (Stage I), primary oocyte (II), primary vitellogenesis (III), secondary vitellogenesis (IV), tertiary vitellogenesis (V) and hyaline oocyte (VI). The annual reproductive cycle in female dab may be divided into four morphologically and histologically distinct periods: prespawning (October-January), spawning (February-April), postspawning (May-June) and resting (July-September) period.

79-000406 Jackson, P. D. SPAWNING AND EARLY DEVELOPMENT OF THE RIVER BLACKFISH, /GADOPSIS MARMORATUS/ RICHARDSON (GADOPSIFORMES: GADOPSIDAE), IN THE MCKENZIE RIVER, VICTORIA. Aust. J. Mar. Freshwater Res. 29 (3): 293-298. June 1978. SFA 24(1)
[Fish. Wildl. Div., Arthur Rylah Inst. Environ. Res., 123 Brown St., Heidelberg, Vic. 3084, Australia] Spawning and development of the river blackfish /G. marmoratus/ were investigated at the McKenzie River in the Grampians, western Victoria. Eggs are deposited inside hollow logs. Removal of logs during some 'river improvement' schemes may have a deleterious effect on spawning. Some preliminary observations on the early development of the river blackfish are described. The species is tentatively classified as belonging to Balon's 'Speleophils' reproductive guild of fishes.

79-000407 Klingbeil, R. A. SEX RATIOS OF THE NORTHERN ANCHOVY, /ENGRAULIS MORDAX/, OFF SOUTHERN CALIFORNIA. Calif. Fish Game 64 (3): 200-209. July 978. SFA 24(1)
[Calif. Dep. Fish Game, Long Beach 90802] Sex ratios for the northern anchovy, /Engraulis mordax/, were calculated from samples taken from the southern California commercial reduction fishery and California Department of Fish and Game Sea Survey cruises for the period 1966-1975. Sex ratios calculated on a seasonal, monthly, and daily basis for the commercial fishery seldom approached the expected 1:1 ratio. Only a few ratios slightly favored males, whereas females were frequently dominant. Although sex ratios for sea survey cruises were most always close to the expected 1:1 ratio, there were a large number of samples that showed extreme dominance of either females or males for those cruises occurring during the period February to June. Sex ratios calculated by area of capture for this same time period suggested a spatial segregation of the sexes.

79-000408 Kuga, T. I.; Dgebuadze, Yu. Yu. SEASONAL DYNAMICS OF SOME BIOLOGICAL INDICATORS OF THE BREAM, /ABRAMIS BRAMA ORIENTALIS/, FROM THE KAMYSHLYBASH LAKES. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (5): 813-816. 1978. SFA 24(1)
[IEMEZh, Moscow, USSR]

79-000409 Kwain, W.-H.; Chappel, J. A. FIRST EVIDENCE FOR EVEN-YEAR SPAWNING PINK SALMON, /ONCORHYNCHUS GORBUSCHA/, IN LAKE SUPERIOR. J. Fish. Res. Board Can. 35 (10): 1373-1376. Oct. 1978. In English with French summ. SFA 24(1)
[Fish Wildl. Res. Br., Ontario Minist. Nat. Resour., Sault Ste. Marie, ON P6A 2B3, Canada]

79-000410 Leggett, W. C.; Carscadden, J. E. LATITUDINAL VARIATION IN REPRODUCTIVE CHARACTERISTICS OF AMERICAN SHAD (/ALOSA SAPIDISSIMA/): EVIDENCE FOR POPULATION SPECIFIC LIFE HISTORY STRAGIES IN FISH. J. Fish. Res. Board Can. 35 (11): 1469-1478. Nov. 1978. In English with French summ. SFA 24(1)
[Dep. Biol., McGill Univ., Montreal, PQ H3A 1E1, Canada]

79-000411 Mochek, A. D. [PECULIARITIES OF REPRODUCTION AND "SOCIAL" BEHAVIOR OF /ABUDEFDUF SAXATILIS/ (PISCES, POMACENTRIDAE).] Zool. Zh. 57 (8): 1189-1195. Aug. 1978. In Russian with English summ. SFA 24(1)
[Inst. Anim. Evol. Morphol. Ecol., USSR Acad. Sci., Moscow, USSR]

79-000412 Peterson, R. H. PHYSICAL CHARACTERISTICS OF ATLANTIC SALMON SPAWNING GRAVEL IN SOME NEW BRUNSWICK STREAMS. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 785. iv + 28p. June 1978. In English with French summ. SFA 24(1)
[Fish. Mar. Serv., Biol. Stn., St. Andrews, NB E0G 2X0, Canada] Gravel composition and permeability were measured in actual and potential salmon spawning habitats in 7 N. B. streams. Particular emphasis was placed on the St. Croix River. Typical particle size distribution of spawning gravel (for a 15-cm core sample) was: cobble (22.2-256 mm), 40-60 percent; pebble (2.2-22.2 mm), 40-50 percent; course sand (0.5-2.2 mm), 10-15 percent; fine sand (0.06-0.5 mm), 0-3 percent. Gravel was stratified with more fine material in the deeper sediments. Permeabilities were usually less than 2000 cm/hr with some Waweig River and Digdeguash River gravels averaging more than 5000 cm/hr. Permeability was weakly correlated with amount of sand in the gravel ($r = 0.6$). St. Croix River gravels were found to be of higher permeability and lower sand content in the downstream study areas. Percent of fry emergence from eggs planted in various gravel bars in the St. Croix varied from 0 to 4 percent. No emergence was obtained in gravel with mean permeability as low as 600 cm/hr.

79-000413 Shestopalova, G. N. REPRODUCTIVE BIOLOGY OF THE IRIKLINSKOYE RESERVOIR BREAM (/ABRAMIS BRAMA/). J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (6): 884-889. 1977. SFA 24(1)
[Orenburg Pedagog. Inst., USSR] Individual bream begin to spawn at a water temperature of 9°C. Spawning is at its height at 16-18°C. Fish of 4+-15+ took part in spawning. The bulk of the spawning males were 5+-8+, females 9+. The bream becomes mature in part at an age of 4+-5+ when males are 25 cm long, females 31 cm. The absolute individual fecundity of the bream ranges from 68.6 to 450.0 thousand eggs (on average 218.3 thousand). In spring 1972 the bream spawned at a depth of 1.5-5 m on submerged shrubs.--Concl.

79-000414 Sutterlin, A. M.; Harmon, P.; Young, B. PRECOCIOUS SEXUAL MATURATION IN ATLANTIC SALMON (/SALMO SALAR/) POSTSMOLTS REARED IN A SEAWATER IMPOUNDMENT. J. Fish. Res. Board Can. 35 (9): 1269-1272. Sept. 1978. In English with French summ. SFA 24(1)
[Fish. Mar. Serv., Biol. Stn., St. Andrews, NB E0G 2X0, Canada]

79-000415 Tsepkin, Ye. A. SPAWNING MODIFICATIONS OF THE MALE "AMUR SLEEPER," /PERCCOTTUS GLEHNI/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (5): 800-801. 1978. SFA 24(1)
[Dep. Ichthyol., Moscow Univ., Moscow, USSR]

MOVEMENTS, SEASONAL AND DEPTH DISTRIBUTION, ETC.

79-000416 Ager, L. M. A BIOTELEMETRY STUDY OF THE MOVEMENTS OF THE WALLEYE IN CENTER HILLS RESERVOIR, TENNESSEE. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 311-323. 1976[1978]. SFA 24(1)
[Ga. Dep. Nat. Resour., Fort Valley 31030] From July, 1974, through July, 1975 the movements of 29 walleye were monitored in Center Hill Reservoir, Tennessee, using ultrasonic telemetric techniques. Seasonally, monitored walleye were most active during the winter and least active during the summer and activity was not correlated with angler success. Diel activity varied from a nocturnal pattern during the summer, to crepuscular during the fall and winter, and no pattern was evident during the spring. Temperature preference was a range of 12°-18°C and the only bathymetric pattern established was that of a preference for the bottom, regardless of depth. However, oxygen was often limiting in the hypolimnetic zone. No patterns were established when the daily rates of movement of walleye were correlated with various environmental variables. Monitored walleye preferred to remain more than 30 meters offshore during all seasons of the year. Also preferences for certain type areas of the reservoir and bottoms were evident. Home ranges were established during winter and summer but not at other times of the year and "homing" to these ranges was exhibited as was "homing" to a previous spawning site.

79-000417 Goldspink, C. R. A NOTE ON THE DISPERSION PATTERN OF MARKED BREAM /ABRAMIS BRAMA/ RELEASED INTO TJEUKEMEER, THE NETHERLANDS. J. Fish Biol. 13 (4): 493-497. Oct. 1978. SFA 24(1)
[Dep. Biol. Sci., Manchester Polytech., England] Following the release of 4619 opercular tagged bream in the Tjeukemeer, 101 fish were subsequently recaptured outside the lake (1969-72). The maximum distance travelled was 60 km. Although the initial dispersal of fish out of the lake appeared to be random there was some evidence of homing once fish had gained access to the IJsselmeer.

79-000418 Saunders, R. L. FIRST SALMON RETURNS TC NORTH AMERICAN SALMON RESEARCH CENTER. N. Am. Salmon Res. Cent. Rep. No. 1-1978. 4p. 1978. SFA 24(1)
[Box 488, St. Andrews, NB E0G 2X0, Canada]

79-000419 Tsukamoto, K.; Kajihara, T.; Masuda, S.; Mori, Y. [DIPSERSION OF AYU JUVENILES IN THE TSUBUSA RIVER--II. DISPERSION AND RECAPTURE.] Bull. Jpn. Soc. Sci. Fish. 44 (9): 961-964. Sept. 1978. In Japanese with English summ. SFA 24(1))
[Ocean Res. Inst., Univ. Tokyo, Nakano, Japan]

FOODS AND FEEDING

79-000420 Adzhimuradov, K. A. THE FEEDING OF JUVENILE BREAM, /ABRAMIS BRAMA ORIENTALIS/, IN THE EARLY DEVELOPMENT STANZAS IN THE ARAKUM REGION (TEREK DELTA). J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (6): 903-907. 1977. SFA 24(1)
[Dagestanian Dep., Caspian Fish. Res. Inst., Makhachkala, USSR]

79-000421 Clarke, T. A. DIEL FEEDING PATTERNS OF 16 SPECIES OF MESOPELAGIC FISHES FROM HAWAIIAN WATERS. NOAA Fish. Bull. 76 (3): 495-513. July 1978. SFA 24(1)
[Hawaii Inst. Mar. Biol., Univ. Hawaii, P.O. Box 1346, Kaneohe 96744]

79-000422 Clymer, J. P. III THE DISTRIBUTIONS, TROPHIC ACTIVITIES, AND COMPETITIVE INTERACTIONS OF THREE SALT MARSH KILLIFISHES (PISCES: CYPRINODONTIDAE). Ph.D. dissertation, Lehigh Univ. 295p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(3):1085. Sept. 1978. SFA 24(1)

79-000423 Deacutis, C. F. EFFECT OF THERMAL SHOCK ON PREDATOR AVOIDANCE BY LARVAE OF TWO FISH SPECIES. Trans. Am. Fish. Soc. 107 (4): 632-635. July 1978. SFA 24(1)
[U.S. EPA, Environ. Res. Lab., Narragansett, RI 02882]

79-000424 Desselle, W. J.; Poirrier, M. A.; Rogers, J. S.; Cashner, R. C. A DISCRIMINANT FUNCTIONS ANALYSIS OF SUNFISH (/LEPOMIS/) FOOD HABITS AND FEEDING NICHE SEGREGATION IN THE LAKE PONTCHARTRAIN, LOUISIANA ESTUARY. Trans. Am. Fish. Soc. 107 (5): 713-719. Sept. 1978. SFA 24(1)
[Dep. Biol. Sci., Univ. New Orleans, Lake Front, New Orleans, LA 70122]

79-000425 DeVane, J. C., Jr. FOOD OF KING MACKEREL, /SCOMBEROMORUS CAVALLA/, IN ONSLOW BAY, NORTH CAROLINA. Trans. Am. Fish. Soc. 107 (4): 583-586. July 1978. SFA 24(1)
[NMFS, Beaufort Lab., Beaufort, NC 28516]

79-000426 Drenner, R. W.; Strickler, J. R.; O'Brien, W. J. CAPTURE PROBABILITY: THE ROLE OF ZOOPLANKTER ESCAPE IN THE SELECTIVE FEEDING OF PLANKTIVOROUS FISH. J. Fish. Res. Board Can. 35 (10): 1370-1373. Oct. 1978. In English with French summ. SFA 24(1)
[Dep. Biol., Tex. Christian Univ., Fort Worth, TX 76129]

79-000427 Fox, P. J. CADDIS LARVAE (TRICHOPTERA) AS PREDATORS OF FISH EGGS. Freshwater Biol. 8 (4): 343-345. Aug. 1978. SFA 24(1)
[P.O. Box 14, Maun, Botswana] Eggs of bullhead (/Cottus gobio/) were found with damaged shells and with the contents removed. Experiments in laboratory aquaria indicated that the damage was caused by caddis larvae and that the type of caddis involved in egg predation might by identified by the nature of the shell damage.

79-000428 Fraser, J. M. THE EFFECT OF COMPETITION WITH YELLOW PERCH ON THE SURVIVAL AND GROWTH OF PLANTED BROOK TROUT, SPLAKE, AND RAINBOW TROUT IN A SMALL ONTARIO LAKE. Trans. Am. Fish. Soc. 107 (4): 505-517. July 1978. SFA 24(1)
[Fish. Br., Ontario Minist. Nat. Resour., Maple, ON L0J 1E0, Canada]

79-000429 Haegele, C. W.; Outram, D. N. THE EFFECTS OF DIET AND RATION ON THE GROWTH AND SURVIVAL OF PACIFIC HERRING (/CLUPEA HARENGUS PALLASI/) LARVAE. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 767. iv + 41p. June 1978. In English with French summ. SFA 24(1)
[Fish. Mar. Serv., Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada] Larval herring were reared in the laboratory on three different diets, each with four daily rations that varied in multiples of 1, 2, 3, and 6. A control receiving no food was also maintained. The control larvae survived for 20 days but those surviving past 8 days were inactive. Larvae receiving only /Artemia/ nauplii survived for 8 weeks but grew lethargic and stopped feeding after 6 weeks. Larvae fed pure wild plankton had poor initial survival with only 10 percent surviving past yolk sac absorption, but a small number survived the length of the experiments (17 wk). Larvae fed on an /Artemia/-plankton diet had the best survival throughout the experiment with over 50 percent of hatched larvae initiating feeding. The number of larvae surviving per tank corresponded to the size of the daily rations. Growth rates were proportional to the number of organisms fed per larva per day with larvae receiving the most plankton having the greatest growth rate of 0.236 mm/day. The smallest growth rate for larvae surviving to the end of the experiment was 0.152 mm/day for larvae receiving the least number of /Artemia/-plankton per larva. Metamorphosis occurred at 25 mm length and was independent of age.

79-000430 Ivanova, M. N. [ON FISH FEEDING OF FRESH-WATER SMELTS /OSMERUS EPERLANUS/ (OSMERIDAE, CLUPEIFORMES).] Zool. Zh. 57 (7): 1033-1039. July 1978. In Russian with English summ. SFA 24(1)
[Inst. Biol. Inland Waters, USSR Acad. Sci., Borok, USSR] The size of smelts is the main factor determining the character of their feeding. During the first years of life the fresh-water smelts feed on invertebrates and begin to feed on fishes at the age of 2-3 years when they attain over 100 mm in length. The fishes constitute the main part of the ration of the oldest and largest smelts in the population. The fish food exerts a marked influence on the biological indices of smelts of the older ages. As compared with the planktophages of the same size, the smelts feeding on fishes have greater body weight and "condition" and, as a result, absolute fecundity of females, what influences positively on the general state of populations of this species.

79-000431 Jenkins, R. M.; Morais, D. I. PREY-PREDATOR RELATIONS IN THE PREDATOR-STOCKING-EVALUATION RESERVOIRS. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 141-157. 1976[1978].
[U.S. FWS, Natl. Reservoir Res. Prog., Fayetteville, AR 72701] The method advanced for estimating prey-predator relations in reservoirs is based on fish standing crop data derived from samples collected in rotenone-treated coves in 23 reservoirs. The sampling, in August 1972 and 1973, was part of a cooperative study conducted under the auspices of the Reservoir Committee, Southern Division of the American Fisheries Society. Estimates were made of sizes of prey species which predators with various mouth sizes could swallow; lengths of all species of predators were then adjusted to equal the lengths of largemouth bass of equivalent predatory capability; and a computer program was developed to calculate biomass of prey available to predators in length classes equivalent to 1-inch length classes of bass 1- to 28 inches long. Results indicated that 50 percent of the populations sampled were deficient in available prey. Stocking of additional predators in these instances would be deemed inadvisable.

79-000432 Jewett, S. C. SUMMER FOOD OF THE PACIFIC COD, /GADUS MACROCEPHALUS/, NEAR KODIAK ISLAND, ALASKA. NOAA Fish. Bull. 76 (3): 700-706. July 1978. SFA 24(1)
[Inst. Mar. Sci., Univ. Alaska, Fairbanks 99701]

79-000433 Kettle, D.; O'Brien, W. J. VULNERABILITY OF ARCTIC ZOOPLANKTON SPECIES TO PREDATION BY SMALL LAKE TROUT (/SALVELINUS NAMAYCUSH/). J. Fish. Res. Board Can. 35 (11): 1495-1500. Nov. 1978. In English with French summ. SFA 24(1)
[Dep. Syst. Ecol., Univ. Kans., Lawrence 66045]

79-000434 Klimova, V. L.; Ivankova, Z. G. EFFECT OF CHANGES IN THE BOTTOM POPULATION OF PETER THE GREAT BAY ON THE FEEDING HABITS AND GROWTH RATE OF SOME SPECIES OF FLOUNDER. Oceanology 17 (5): 591-594. Apr. 1978. SFA 24(1)
A description is given of the considerable changes that have occurred in the makeup of the food components of the chief flounder species as a result of a change in their food stocks. The biggest change in feeding habits is noted in the case of the yellowfin sole. The possible effect of these changes on the growth rate of some flounder species is considered.

79-000435 Magnin, E.; Murawska, E.; Clement, A.-M. REGIME ALIMENTAIRE DE SEP POISSONS LITTORAUX DE LA GRANDE ANSE DE L'ILE PERROT, SUR LE LAC SAINT-LOUIS, PRES DE MONTREAL, QUEBEC. [FOOD HABITS OF SEVEN LITTORAL FISHES OF THE GRAND COVE OF PERROT ISLAND OF LAKE SAINT-LOUIS NEAR MONTREAL, QUEBEC.] Nat. Can. (Que.) 105 (2): 89-101. Mar.-Apr. 1978. In French with English summ. SFA 24(1)
[Dep. Sci. Biol., Univ. Montreal, CP 6128, Montreal, PQ H3C 3J7, Canada] Stomach content analyses of 868 fishes were performed from May to October 1972. /Pimephales notatus/ (32) was only phytoplanktonophagous. /Notemigonus crysoleucas/ (306) and /Notropis volucellus/ (188) ate mainly phyto- and zooplankton. Other four fishes were eating the benthic organisms: Amphipoda and insects larvae as /Ambioplites rupestris/ (48) and /Fundulus diaphanus/ (89), insects larvae as /Lepomis gibbosus/ juvenils (88) or Mollusks as old /Lepomis gibbosus/ (81) or organisms diversified as /Etheostoma exile/ (36). Comparisons were made between organisms present in stomach contents and those present in littoral part of Lake Saint-Louis.

79-000436 Major, P. F. PREDATOR-PREY INTERACTIONS IN TWO SCHOOLING FISHES, /CARANX IGNOBILIS/ AND /STOLEPHORUS PURPUREUS/. Anim. Behav. 26 (3) 760-777. Aug. 1978. SFA 24(1)
[Coast. Mar. Lab., Univ. Calif., Santa Cruz 95064] Interactions between the jack, /Caranx ignobilis/, a facultative schooling species, and the Hawaiian anchovy, /Stolephorus purpureus/, an obligate schooler were studied within an enclosure in the field in Hawaii. Single predators were the most successful at capturing isolated (individual) prey, and relatively unsuccessful at capturing individuals in schools. Grouped (schooled) predators were the most successfu' at capturing schooled prey. The leading, or first, predator was the most successful member of a group or school at capturing isolated or schooled prey. Following predators tended to make it possible to catch more prey earlier in the experiments. Larger predator groups were able to break up schools of prey quickly resulting in increased numbers of prey becoming isolated. These prey were captured before they could reform or join the other schools. As the initial size of the prey school increased, the percent of individuals captured declined. Schooling in prey reduces the time a visually orienting predator has to align himself with an indivdual prey. Schooling in predators may have co-evolved as an adaptation, making it possible for predators to break up and isolate schooled prey. Larger prey schools may have co-evolved to satiate or swamp the feeding capacity of a finite number of schooled predators and decrease the probability that a specific given individual would be captured.

79-000437 Meehan, W. R.; Miller, R. A. STOMACH FLUSHING: EFFECTIVENESS AND INFLUENCE ON SURVIVAL AND CONDITION OF JUVENILE SALMONIDS. J. Fish. Res. Board Can. 35 (10): 1359-1363. Oct. 1978. In English with French summ. SFA 24(1)
[U.S. For. Serv., Pac. Northwest For. Range Exp. Stn., For. Sci. Lab., Corvallis, OR 97331]

79-000438 Moyle, P. B.; Holzhauser, N. J. EFFECTS OF THE INTRODUCTION OF MISSISSIPPI SILVERSIDE (/MENIDIA AUDENS/) AND FLORIDA LARGEMOUTH BASS (/MICROPTERUS SALMOIDES FLORIDANUS/) ON THE FEEDING HABITS OF YOUNG-OF-YEAR LARGEMOUTH BASS IN CLEAR LAKE, CALIFORNIA. Trans. Am. Fish. Soc. 107 (4): 574-582. July 1978. SFA 24(1)
[Div. Wildl. Fish. Biol., Univ. Calif., Davis 95616]

79-000439 Overton, C. K.; Grove, D. A.; Johnson, D. W. FOOD HABITS OF ROCKY MOUNTAIN WHITEFISH (/PROSOPIUM WILLIAMSONI/) FROM THE TETON RIVER IN RELATION TO THEIR AGE AND GROWTH. Northwest Sci. 52 (3,Part 1): 226-232. Aug. 1978. SFA 24(1)
[Dep. Biol., Idaho State Univ., Pocatello 83201] Food habits of Rocky Mountain whitefish (/Prosopium williamsoni/) were related to age classes. Three dominant families of food items in the diet of whitefish were Chironomidae, Hydroptilidae, and Dytiscidae. Chironomids occurred in all fish. The percent of chironomids in the diet decreased as the ages increased. Statistical analysis of diversity of food habits between age classes revealed significant differences, except between age class one and two, and age three and combined ages four and five, which may mean that within these subgroups fish could compete for food.

79-000440 Pearcy, W. G.; Hancock, D. FEEDING HABITS OF DOVER SOLE, /MICROSTOMUS PACIFICUS/; REX SOLE, /GLYPTOCEPHALUS ZACHIRUS/; SLENDER SOLE, /LYOPSETTA EXILIS/; AND PACIFIC SANDAB, /CITHARICHTHYS SORDIDUS/, IN A REGION OF DIVERSE SEDIMENTS AND BATHYMETRY OFF OREGON. NOAA Fish. Bull. 76 (3): 641-651. July 1978. SFA 24(1)
[Sch. Oceanogr., Oreg. State Univ., Corvallis 97331]

79-000441 Selgeby, J. H.; MacCallum, W. R.; Swedberg, D. V. PREDATION BY RAINBOW SMELT (/OSMERUS MORDAX/) ON LAKE HERRING (/COREGONUS ARTEDII/) IN WESTERN LAKE SUPERIOR. J. Fish. Res. Board Can. 35 (11): 1457-1463. Nov. 1978. In English with French summ. SFA 24(1)
[U.S. FWS, Ashland, WI 54806]

79-000442 Sheridan, P. F. TROPHIC RELATIONSHIPS OF DOMINANT FISHES IN THE APALACHICOLA BAY SYSTEM (FLORIDA). Ph.D. dissertation, Fla. State Univ. 232p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(3): 1081. Sept. 1978. SFA 24(1)

79-000443 Shubnikov, D. A. A COASTAL-ESTUARINE COMMUNITY OF FISHES OF THE NORTH INDIAN OCEAN AND THE ECOLOGICAL RELATIONSHIPS OF ITS COMPONENTS. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (5): 693-709. 1978. SFA 24(1)
[VNIRO, Moscow, USSR] The trophic links in the coastal-estuarine zone of the north Indian Ocean were examined; the important role of detritus-feeding necto-benthic invertebrates (mainly crustaceans) and the fish feeding on them are significant links in the trophic web. The costal-estuarine fish fauna is subdivided into ecological groups, depending on their relation to salinity and on their feeding.

79-000444 Slonova, S. A. THE FEEDING OF THE WHITE SEA HERRING, /CLUPEA HARENGUS MARIS-ALBI/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (6): 908-912. 1977. SFA 24(1)
[Polar Res. Plan. Inst. Sea Fish. Oceanogr., Archangel, USSR] The White Sea herring, /Clupea harengus maris-albi/, feeds mainly on comparitively large organisms: Calanoida, Amphipoda, Euphausiacea. In their absence the herring transfers to feeding on small copepods and cirripeds. In rare instances it consumes juvenile fishes. The range of the herring during the feeding period is wider in warm years when the food organisms become more available and conditions favoring feeding are created. A reciprocal relationship has been established between the level of food consumption by the White Sea herring and its condition factor.

79-000445 Spataru, P. FOOD AND FEEDING HABITS OF /TILAPIA ZILLII/ (GERVAIS) (CICHLIDAE) IN LAKE KINNERET (ISRAEL). Aquaculture 14 (4): 327-338. Aug. 1978. SFA 24(1)
[Fish Aquacult. Res. Stn., Dor, Mobile Post, Hof Hacarmel, Israel] Analysis of the gut content of 329 speciments of /T. zillii/ (Cichlidae) collected from Lake Kinneret, has shown great variation in the sorts of food. A study of seasonal dynamics has proved the prevalence in the food of Chironomida pupae (Diptera) in winter and spring and of zooplankton forms in summer and autumn. The additional food consisted of the various groups of algae, the most frequently found being Cyanophyta (100 percent) and Pyrrophyta (64.16 percent). An extremely voraceous species, it consumes-- while searching for its preferred food--anything that comes its way in the water: algae, scraps of macrophytes, autochthonous and allochthonous insects, and

79-000445 CONTINUED
forms of benthic origin, such as Nematoda, Ostracoda, Porifera and Chironomida (larvae). The satiation index is high (between 4.08 and 5.63), in contradiction to the low values of the coefficient of condition (between 3.05 and 3.51), and with the slow rate of growth in Lake Kinneret. The main food of /Tillipia zillii/, consists of arthropod species with a chitin content (which is eliminated unchanged) of more than 50 percent of the total weight, and this may account for the poor exploitation of the trophic base. This species of fish may be considered as being detrimental to others (i.e. commercially important species) because of its successful competition for food, and not, as is often incorrectly assumed, because it is an agressive consumer of their spawn and fry.

79-000446 Sullivan, J. F.; Atchison, G. J. PREDATOR-PREY BEHAVIOUR OF FATHEAD MINNOWS, /PIMEPHALES PROMELAS/ AND LARGEMOUTH BASS, /MICROPTERUS SALMOIDES/ IN A MODEL ECOSYSTEM. J. Fish Biol. 13 (2): 249-253. Aug. 1978. SFA 24(1)
[Bionucleon. Dep., Sch. Pharm. Pharm. Sci., Purdue Univ., West Lafayette, IN 47907] The predator-prey behaviours displayed by largemouth bass, /Micropterus salmoides/ and fathead minnows, /Pimephales promelas/, were investigated. Fathead minnows were subjected to predation by largemouth bass and observed in a model system that was designed to mimic a natural ecosystem. Anti-predator devices utilized by fathead minnows include schooling, surface swimming, formation of a circular aggregation, and seeking refuge under vegetation.

79-000447 Taylor, W. W. RAINBOW TROUT PREDATION ON THE POPULATION OF /DAPHNIA PULEX/ IN BECKER LAKE, ARIZONA. Ph.D. dissertation, Ariz. State Univ. 95p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(3): 1130. Sept. 1978. SFA 24(1)
The effect of rainbow trout (/Salmo gairdneri/) predation on the population dynamics and production of the water flea, /Daphnia pulex/, was examined during 1976 and 1977 in Becker Lake, a 40.5 ha reservoir in northeastern Arizona. Rainbow trout were size-biased feeders, utilizing daphnids which were 1.3 mm in size or larger. Trout predation upon /Daphnia pulex/ occurred mainly during the winter and early spring when their numbers were relatively low and their clutch size high. This suggests that brood pigmentation was utilized by trout in selecting which /Daphnia/ to consume. The majority of /Daphnia/ mortality was due to non-predatory causes as generally less than 6 percent could be attributed to trout predation. The annual production of /Daphnia pulex/ was 10.9 g/m^3; a value which is indicative of the eutrophic nature of Becker Lake. Trout consumed generally less than 3 percent of the monthly /Daphnia/ production, but in one exceptional case 24.8 percent of the February, 1977, production was ingested. Turnover ratio (P/B) for the daphnids ranged between 3.6 and 21.0 on a monthly basis with maximum rates occurring during the warm summer months. The /D. pulex/ population exhibited a bimodal seasonal abundance curve which was the result of ephippial egg production and trout predation during the winter and poor food quality/quantitiy during the summer.--From abstr.

79-000448 Winstanley, R. H. FOOD OF THE TREVALLA /HYPEROGLYPHE POROSA/ (RICHARDSON) OFF SOUTH-EASTERN AUSTRALIA. N.Z. J. Mar. Freshwater Res. 12 (1): 77-79. Mar. 1978. SFA 24(1)
[Fish. Wildl. Div., Arthur Rylah Inst. Environ. Res., 123 Brown St., Heidelberg, Victoria, Australia 30804] The diet of the bluenose or deepsea trevalla /Hyperoglyphe porosa/ (Richardson) was determined from the stomach contents of 78 trevalla caught at five localities over the continental slope off south-eastern Australia (37-39° S, 142-151° E). The pelagic tunicate /Pyrosoma atlanticum/ Peron was the most common organism present, although squids, pelagic and benthic fishes, and crustaceans were found in the stomachs of some trevalla. Trevalla are probably benthopelagic and feed mainly above the bottom during the day; at night they stop feeding and move to the bottom.

79-000449 Zadorozhnaya, Ye. A. THE FEEDING OF THE BREAM, /ABRAMIS BRAMA/, IN RESERVOIRS ON SMALL RIVERS (AS EXEMPLIFIED BY MOZHAYSK RESERVOIR). J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (5): 751-759. 1978. SFA 24(1)
[State Res. Inst. Lake River Fish., Konakovo, USSR] The specifics of the feeding of the bream, /Abramis brama/, by seasons in years with a different hydrologic regime (1969-1971) and its daily rhythm were studied, its daily rations determined, making it possible to establish the role of the bream in the removal of organic matter from the body of water.

AGE AND GROWTH

79-000450 Blake, C.; Blake, B. F. THE USE OF OPERCULAR BONES IN THE STUDY OF AGE AND GROWTH IN /LABEO SENEGALENSIS/ FROM LAKE KAINJI, NIGERIA. J. Fish Biol. 13 (2): 287-295. Aug. 1978. SFA 24(1)
[APDO 1238, Mazatlan, Sinaloa, Mexico] Check marks were found on the scales and opercular bones of /Labeo senegalensis/ from Lake Kainji, Nigeria. The scale marks were often indistinct and difficult to interpret, but an attempt was made to determine age from the opercular bones. At least two check marks per year were found on the opercular bones, one of these occurring during June-July, and the other during January. The relationship between opercular length and fish total length was plotted logarithmically and back-calculations of length made. Problems of interpretation are dicussed in relation to possible causes of ring formation.

79-000451 Burrough, R. J.; Kennedy, C. R. INTERACTION BETWEEN PERCH (/PERCA FLUVIATILIS/), AND BROWN TROUT, (/SALMO TRUTTA/). J. Fish Biol. 13 (2): 225-230. Aug. 1978. SFA 24(1)
[Dep. Biol. Sci., Univ. Exeter, England] A decline in the growth rate of perch in Malham Tarn, Yorkshire, has occurred in recent times. This was found to coincide precisely with the resumption of stocking of brown trout, after a period of several years during which no stocking took place. In the absence of any other known correlating factor, it is suggested that the increase in population density of the trout may be responsible for the observed decline in perch growth.

79-000452 Cloern, J. E.; Nichols, F. H. A VON BERTALANFFY GROWTH MODEL WITH A SEASONALLY VARYING COEFFICIENT. J. Fish. Res. Board Can. 35 (11): 1479-1482. Nov. 1978. In English with French summ. SFA 24(1)
[U.S.G.S., Menlo Park, CA 94025]

79-000453 Dourado, O. F.; Davies, W. D. LENTH-WEIGHT RELATIONSHIPS AND CONDITION INDICES OF FISHES FROM RESERVOIRS OF CEARA, BRAZIL. Int. Cent. Aquacult. Res. Dev. Ser. No. 18. 7p. Mar. 1978. SFA 24(1)
[Engenheiro Agron. Conv. SUDENE/DNOCS/USAID, Cent. Pesq. Ictiol., Fortaleza, Brazil]

79-000454 El-Shamy, F. M. DYNAMICS OF FEEDING AND GROWTH OF BLUEGILL (/LEPOMIS MACROCHIRUS/) IN LAKE WINGRA AND LAKE MENDOTA, WISCONSIN. Hydrobiologia 60 (2): 113-124. 18 Aug. 1978. SFA 24(1)
[D'Appolonia Consulting Engineers Inc., 10 Duff Rd., Pittsburgh, PA 15235] Adult bluegill grew faster in Lake Mendota than in Lake Wingra. One and two year old fish from both lakes had similar growth patterns and grew at a rate similar to that of fish from other lakes. Small fish from the two lakes (averaging 10 g) had comparable rations in July but larger fish (averaging 50 g) had daily rations of 3 percent in Lake Mendota compared to 1 percent for Lake Wingra fish. Mean number of benthic organisms varied from 364 to 80 per m^2 in Lake Wingra as opposed to 1560 to 450 organisms per m^2 in Lake Mendota. Fish in Lake Wingra fed selectively on /Daphnia/ and /Cyclops/, which, although small in size, were relatively larger than the other plankton species. Bluegill from Lake Mendota, on the other hand, fed mainly on large macroinvertebrates such as /Hyalella/ and insects.

79-000455 Gebhart, G. E.; Summerfelt, R. C. SEASONAL GROWTH RATES OF FISHES IN RELATION TO CONDITIONS OF LAKE STRATIFICATION. Proc. Okla. Acad. Sci. 58: 6-10. 1978. SFA 24(1)
[Okla. Coop. Fish. Res. Unit, Okla. State Univ., Stillwater] The effect of lake stratification and hypolimnetic anoxia on growth of gizzard shad (/Dorosoma cepidianum/), white crappie (/Pomoxis annularis/), and freshwater drum (/Aplodinotus grunniens/) was studied in Arbuckle Lake, Oklahoma. The percentage of total available fish habitat of Arbuckle Lake was decreased by anoxic conditions to 72.9 percent in 1973, 82.7 percent in 1974, and 72.7 percent in 1975. In 6 of 8 species-age group comparisons, the growth rate was highest in 1974 when more usable fish habitat was available than in other years. In 18 species-age group comparisons of fish growth rates in the summer stratified period with growth of the same age fish in the destratified overwinter period, the growth was faster in the destratified interval 12 times and faster in the stratified inverval 6 times. It appears that lake stratification and the resultant loss of fish habitat retarded the growth of the fish.

79-000456 Gee, A. S. THE DISTRIBUTION AND GROWTH OF COARSE FISH IN GRAVEL-PIT LAKES IN SOUTH-EAST ENGLAND. Freshwater Biol. 8 (4): 385-394. Aug. 1978. SFA 24(1)
[Dep. Biol. Sci., City London Polytech., London, England] Age and growth rates of the coarse fish of thirty-nine gravel-pit lakes in south-east England are compared. Species composition was very variable, the commonest species being roach (/Rutilus rutilus/), bream (/Abramis brama/), tench (/Tinca tinca/), perch (/Perca fluviatilis/) and pike (/Esox lucius/). Two main kinds of fish community were identifiable from the survey: (1) those consisting of a mixture of cyprinids, usually roach and bream; and (2) those in which cyprinids were rare or absent and the fish community was composed of perch and

79-000456 CONTINUED
pike. The majority of the lakes fell into the first category. Comparison of growth curves derived by back-calculation showed that, in all species, variation occurred from lake to lake and from year to year. The majority of gravel-pit lake fishes had 'medium' growth rates when compared with published data by other workers on different waters. Seasonal growth of roach infected with plerocercoids of /Ligula intestinalis/ was observed at monthly intervals. Annulus formation on the scales of these fish occurred at the onset of growth in May. The heavy /Ligula/ burden in 89 percent of these fish had not caused the formation of any additional or false rings.

79-000457 Glenn, C. L. SEASONAL GROWTH AND DIETS OF YOUNG-OF-THE-YEAR MOONEYE (/HIODON TERGISUS/) FROM THE ASSINIBOINE RIVER, MANITOBA. Trans. Am. Fish. Soc. 107 (4): 587-589. July 1978. SFA 24(1)
[Dep. Zool., Brandon Univ., Brandon, MB R7A 6A9, Canada]

79-000458 Gunnes, K.; Gjedrem, T. SELECTION EXPERIMENTS WITH SALMON. IV. GROWTH OF OF ATLANTIC SALMON DURING TWO YEARS IN THE SEA. Aquaculture 15 (1): 19-33. Sept. 1978. SFA 24(1)
[Dep. Anim. Genet. Breed., Agric. Univ. Norway, As-NLH, Norway]
Brood stock of Atlantic salmon were sampled from 37 rivers or riversystems (strains) for three consecutive years. Each strain was represented by several full- and half-sib families. during the freshwater period each full-sib family was reared separately and each group was given as equal environmental conditons as possible. Fingerlings large enough to become 1-year-old smolt were freeze-branded and smolts from the different strains were sampled and transported to five salmon farms along the Norwegian coast. This paper deals with body weight and length of Atlantic salmon after a growth period of 2 years in the sea. Significant differences between strains were found for all three year classes. The interaction farm x strain was significant but accounted for only a small part of the total variation. It is concluded that genotype x environment interaction can be ignored when planning a selection programme for Atlantic salmon for Norwegian farming conditons. A significant interaction sire x dam was found for the 1972 year-class, implying the presence of nonadditive genetic variation. The heritabilities for body weight and length estimated from sire components (year-class 1973 and 1974) were quite high: 0.31 and 0.28, respectively. Genetic correlations between body weight and length were close to unity. The heritabilities for condition factor ($K=(\text{weight in g})/(\text{length in cm})^3 \times 100$) were small and none of the sire components were significant. It is concluded that the combination of weight and length used in calculating the K-factor has minor genetic basis. Genetic variation in body weight of Atlantic salmon is high, and about three times as high as for body length.

79-000459 Heller, R. F. THE ROLE OF ABIOTIC AND BIOTIC FACTORS IN THE ENVIRONMENT ON GROWTH IN THE ZEBRAFISH, /BRACHYDANIO RERIO/ (HAMILTON-BUCHANAN). Ph.D. dissertation, N.Y. Univ. 116p. 1976. From Diss. Abstr. Int. B Sci. Eng. 38(2):545. Aug. 1977. SFA 24(1)

79-000460 Inman, C. R.; Dewey, R. C.; Durocher, P. P. GROWTH COMPARISONS AND CATCHABILITY OF THREE LARGEMOUTH BASS STRAINS. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 40-47. 1976[1978]. SFA 24(1)

[Tex. Parks Wildl. Dep., Tyler 75701] Florida largemouth bass, /Micropterus salmoides floridanus/ (Le Sueùr), northern largemouth bass, /M. s. salmoides/ (Lacepede), and their F(1) hybrid were stocked in a 3.64-hectare pond, and their growth rates and catchability compared. The hybrid and Florida bass were found to achieve the best growth over a 3-yr period, apparently due to genetic influences rather than environmental factors. Differences in catchability were not observed among the three strains of largemouth bass.

79-000461 Manooch, C. S. III AGE, GROWTH AND MORTALITY OF THE WHITE GRUNT, /HAEMULON PLUMIERI/ LACEPEDE (PISCES: POMADASYIDAE), FROM NORTH CAROLINA AND SOUTH CAROLINA. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 58-70. 1976[1978]. SFA 24(1)

[NMFS, Atl. Estuarine Fish. Cent., Beaufort, NC 28516] Scales and otoliths of the white grunt, /Haemulon plumieri/, sampled from the North Carolina and South Carolina headboat fishery were examined to determine if they could be used to age the species. Both structures were satisfactory, 76 percent of the fish examined could be aged by scales and approximately the same percentage by otoliths. agreement for a given age between otoliths and scales taken from the same fish was 75 percent. The oldest fish collected was XIII; 589 mm total length. Growth occurred from about mid-March to November. Back-calculated mean lengths ranged from 97 mm at end of year 1 to 550 at end of year 13. The Bertalanffy equation describing theoretical growth in length is: $l(t) = 640 (1 - e^{-0.1084 (t + 1.007)})$. Total mortality estimates, based on catch curves from over 5,000 fish, ranged from 37 percent to 51 percent varying between years and geographical area. The length-weight relationship is described by the equation $W = 0.00001426L^{3.0229}$; $W = 0.00001201L^{3.0503}$ for males, and $W = 0.00001452L^{3.0214}$ for females.

79-000462 Warburton, K. AGE AND GROWTH DETERMINATION IN A MARINE CATFISH USING AN OTOLITH CHECK TECHNIQUE. J. Fish Biol. 13 (4): 429-434. Oct. 1978. SFA 24(1)

[Dep. Mar. Biol., Univ. Liverpool, Port Erin, Isle of Man, British Isles] A direct and accurate method of age determination using the relative positions of otolith growth checks is described. In the catfish /Galeichthys caerulescens/, otolith length and depth were both linearly related to fish length. Checks appeared to be formed twice per year, at the beginning and at the end of the rainy season (late June to late September). Growth was more rapid in the wet season, when water temperatures were at their height. Calculated mean fork lengths of spring-spawned fish after the first four years of life were respectively 11.5, 19.3, 26.3 and 33.1 cm. Few individuals grew beyond 40 cm, the survival of most of the population being five years or less, but a maximum recorded length of 51.5 cm suggested that catfish may occasionally persist into their seventh or eighth year. The shape of the growth curve indicated that, since a permanent seaward migration of older fish is unlikely, then natural mortality among lagoon-resident /G. caerulescens/ occurs before a growth asymptote is reached.

79-000463 Wolfe, G. W.; Bauer, B. H.; Branson, B. A. AGE AND GROWTH, LENGTH-WEIGHT RELATIONSHIPS, AND CONDITION FACTORS OF THE GREENSIDE DARTER FROM SILVER CREEK, KENTUCKY. Trans. Ky. Acad. Sci. 39 (3-4): 131-134. Sept. 1978. SFA 24(1)
[Dep. Zool., Univ. Tenn., Knoxville 37916] Data on age and growth were obtained from 203 greenside darters from Silver Creek, Madison County, Kentucky, during February and March 1973. The fish length-scale length relationship was TL = 20.16 + 0.9937 SR. Males were larger than females at all ages, but relative to their respective calculated maximum lengths, females grew more rapidly except during the last year of life. The length-weight relationship was log W = -5.1894 + 3.1199 log L for the combined sexes. Conditon factor (K) increased with age, but there was no significant difference between males and females.

79-000464 Wolfert, D. R.; Miller, T. J. AGE, GROWTH, AND FOOD OF NORTHERN PIKE IN EASTERN LAKE ONTARIO. Trans. Am. Fish. Soc. 107 (5): 696-702. Sept. 1978. SFA 24(1)
[U.S. FWS, Sandusky Biol. Stn., Sandusky, OH 44879]

GEOGRAPHICAL DISTRIBUTION, FISH SURVEYS, ETC.

79-000465 Au, K.-C. A FIELD KEY TO THE HONG KONG SEABREAMS OF THE GENUS /MYLIO/ LACEPEDE, FAMILY SPARIDAE. J. Nat. Hist. 12 (6): 627-631. Nov.-Dec. 1978. SFA 24(1)
[Mar. Sci. Lab., Chinese Univ. Hong Kong, Shatin, New Territories, Hong Kong]

79-000466 Baranes, A.; Ben-Tuvia, A. OCCURRENCE OF THE SANDBAR SHARK /CARCHARHINUS PLUMBEUS/ IN THE NORTHERN RED SEA. Isr. J. Zool. 27 (1): 45-51. 1978. SFA 24(1)
[Dep. Zool., Hebrew Univ. Jerusalem, Jerusalem, Israel]

79-000467 Barr, W. C.; Holbrook, J. A. II A METHOD FOR ANALYSIS OF DIFFERENCES IN FISH COMMUNITY SPECIES OCCURRENCES. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 276-279. 1976[1978]. SFA 24(1)
[TVA, Norris, TN 37828] The occurrences of the 20 most abundant fish species in impoundments of each of seven rivers were compared using Long's index of faunal resemblance. Higher order systems, i.e., larger rivers, contain more species than smaller rivers. Also, impoundments of larger river systems tend to be more similar, while those on smaller rivers maintain their unique faunal assemblages.

79-000468 Burgess, G. H.; Franz, R. ZOOGEOGRAPHY OF THE AQUATIC FAUNA OF THE ST. JOHNS RIVER SYSTEM WITH COMMENTS ON ADJACENT PENINSULAR FAUNAS. Am. Midl. Nat. 100 (1): 160-170. July 1978. SFA 24(1)
[Dep. Zool., Univ. Fla., Gainesville 32611]

79-000469 Cadwallader, P. L. ACCLIMATISATION OF RUDD /SCARDINIUS ERYTHROPHTHALMUS/ (PISCES: CYPRINIDAE), IN THE NORTH ISLAND OF NEW ZEALAND. N.Z. J. Mar. Freshwater Res. 12 (1): 81-82. Mar. 1978. SFA 24(1)
[Snobs Creek Freshwater Fish. Res. Stn., Private Bag 20, Alexandra, Victoria 3714, Australia] The results of a survey carried out during the summer of 1974-75 indicate that rudd /Scardinius erythrophthalmus/ have become successfully acclimatised in New Zealand. Rudd were caught in 21 of 25 North Island waters in which they were known to have been liberated and had reproduced in at least 18 of these waters.

79-000470 Cavender, T. M. TAXONOMY AND DISTRIBUTION OF THE BULL TROUT, /SALVELINUS CONFLUENTUS/ (SUCKLEY), FROM THE AMERICAN NORTHWEST. Calif. Fish Game 64 (3): 139-174. July 1978. SFA 24(1)
[Mus. Zool., Ohio State Univ., Columbus] Morphological and distributional evidence is presented favoring the specific distinction of the bull trout, /Salvelinus confluentus/ (Suckley), a currently unrecognized from of /Salvelinus/ native to western North America. This species has been confused with the Dolly Varden, /Salvelinus malma/ (Walbaum). Separation of the two is based primarily on characters of the head and cranial skeleton. Diagnosis and description are given for the bull trout along with a history of its early taxonomy. Past and present distribution of the bull trout ranges between lat 41° and 60°N. North of the 49th parallel it is found in most of the major drainages originating on both sides of the Continental Divide. The bull trout is or at one time was sympatric with the Dolly Varden in at least three major river systems, as well as the waters of Puget Sound.

79-000471 Chervinski, J. FIRST RECOVERY OF /LIZA CARINATA/ (TELEOSTEI: MUGILIDAE) FROM LAKE KINNERET. Isr. J. Zool. 27 (1): 52. 1978. SFA 24(1)
[Fish Aquacult. Res. Stn., Agric. Res. Organ., Dor, Doar Na Hof Hacarmel, Israel]

79-000472 Chittenden, M. E., Jr.; Moore, D. COMPOSITION OF THE ICHTHYOFAUNA INHABITING THE 110-METER BATHYMETRIC CONTOUR OF THE GULF OF MEXICO, MISSISSIPPI RIVER TO THE RIO GRANDE. Northeast Gulf Sci. 1 (2): 106-114. Dec. 1977. SFA 24(1)
[Dep. Wildl. Fish. Sci., Tex. A&M Univ., College Station 77843]

79-000473 Fritzsche, R. A. THE FIRST EASTERN PACIFIC RECORDS OF BULLEYE, /COOKEOLUS BOOPS/ (BLOCH AND SCHNEIDER, 1801), (PISCES, PRIACANTHIDAE). Calif. Fish Game 64 (3): 219-221. July 1978. SFA 24(1)
[Dep. Biol., Univ. Miss., University 38677]

79-000474 Gorbunova, N. N. DISTRIBUTION OF LARVAE OF SOME GEMPYLIDAE SPECIES (PISCES, TRICHIUROIDAE). Oceanology 17 (6): 732-735. June 1978. SFA 24(1)

79-000475 Haedrich, R. L.; Krefft, G. DISTRIBUTION OF BOTTOM FISHES IN THE DENMARK STRAIT AND IRMINGER SEA. Deep-Sea Res. 25 (8): 705-720. Aug. 1978. SFA 24(1)
[Woods Hole Oceanogr. Inst., Woods Hole, MA 02543]

79-000476 Hess, T. B.; Winger, P. V. THE OCCURRENCE AND DISTRIBUTION OF LARVAL FISH IN THE CUMBERLAND RIVER. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 295-310. 1976[1978]. SFA 24(1)
[Ga. Dep. Nat. Resour., Social Circle 30279] The seasonal distribution of larval fish in the Cumberland River was studied in 1974 and 1975 as part of an environmental monitoring program at the site of the proposed Hartsville Nuclear Power Plant near Dixon Springs, Tennessee. Meter and half-meter diameter nets were used to collect 13,571 larval or young juvenile fish of 13 families during evening hours from April to mid-August. Clupeids, catostomids and /Lepomis/ sp. dominated the collections during both years. Concentrations of larval fish were significantly ($P \geq 0.05$) higher in the Dixon Creek backwater area than in the river proper. Equations were developed by stepwise multiple regression to predict the seasonal abundance of major taxa and total larval fish populations by water temperature and discharge correlations.

79-000477 Horwitz, R. J. THE DISTRIBUTION OF FISHES IN STREAMS. Ph.D. dissertation, Univ. Chicago 1976. From Diss. Abstr. Int. B Sci. Eng. 38(2):488. Aug. 1977. SFA 24(1)

79-000478 Hyle, R. A. II FISHES OF THE NEWPORT RIVER ESTUARY, NORTH CAROLINA, THEIR COMPOSITION, SEASONALITY AND COMMUNITY STRUCTURE, 1970-72. Ph.D. dissertation, Univ. N.C. (Chapel Hill) 205p. 1976. From Diss. Abstr. Int. B Sci. Eng. 38(2):459. Aug. 1977. SFA 24(1)

79-000479 Jones, D. H.; John, A. W. G. A THREE-SPINED STICKLEBACK, /GASTEROSTEUS ACULEATUS/ L. FROM THE NORTH ATLANTIC. J. Fish Biol. 13 (2): 231-236. Aug. 1978. SFA 24(1)
[Inst. Terr. Ecol., 12 Hope Terrace, Edinburgh EH9 2AS, Scotland] An unusual occurrence of a three-spined stickleback, /Gasterosteus aculeatus/, is described from Ocean Weather Station /India/ in the North-east Atlantic. Previous records of /G. aculeatus/ caught well offshore are summarised and reasons for these occurrences are suggested. Mention is made of the possibility of sticklebacks breeding in the open ocean.

79-000480 Joseph, T. W.; Sinning, J. A.; Behnke, R. J.; Holden, P. B. AN EVALUATION OF THE STATUS, LIFE HISTORY, AND HABITAT REQUIREMENTS OF ENDANGERED AND THREATENED FISHES OF THE UPPER COLORADO RIVER SYSTEM. U.S. Fish Wildl. Serv. FWS/OBS-77/62. x + 184p. Sept. 1977. SFA 24(1)
[Ecology Consultants, Inc., 1716 Heath Parkway, Fort Collins, CO 80526]

79-000481 Jubb, R. A. SHARP-TOOTH CATFISH, /CLARIAS GARIEPINUS/, IN THE GREAT FISH RIVER, EASTERN CAPE. Piscator No. 102. p. 24-27. 1978. SFA 24(1)

79-000482 Kortmulder, K.; Feldbrugge, E. J.; de Silva, S. S. A COMBINED FIELD STUDY OF /BARBUS (=PUNTIUS) NIGROFASCIATUS/ GUNTHER (PISCES, CYPRINIDAE) AND WATER CHEMISTRY OF ITS HABITAT IN SRI LANKA. Neth. J. Zool. 28 (1): 111-131. Mar. 1978. SFA 24(1)
[Zool. Lab., Univ. Leiden, Leiden, The Netherlands] This paper is part of a series dealing with the biology and behaviour of Sri Lanka Cyprininae. The present paper investigates the natural environment (both morphologically and chemically) and the behaviour in the field of /Barbus nigrofasciatus/, a species formerly studied in detail in captivity. Concordance between the behaviour as observed in aquaria and in the field is nearly perfect. Predictions, based on the aquarium studies, as to the shape of the natural environment and of the movements of the fishes in it are tested in the field and found to be largely correct. The species is likely to be endangered if present trends (deforestation, fishing) continue. Further, in this paper, the assessment of pH by means of a colorimetric method is critically evaluated and corrections on the method proposed.

79-000483 Lenanton, R. C. J. ASPECTS OF THE ECOLOGY OF FISH AND COMMERCIAL CRUSTACEANS OF THE BLACKWOOD RIVER ESTUARY WESTERN AUSTRALIA. Fish. Res. Bull. West. Aust. No. 19. 72p. 1977. SFA 24(1)
[Dep. Fish. Wildl., Perth, Western Australia]

79-000484 Luling, K. H. WISSENSCHAFTLICHE ERGEBNISSE DER PERU-EXPEDITION DR. K. H. LULING 1972 UND DER BRASILIEN-PERU-EXPEDITION 1974: ICHTHYOLOGISCHE UND GEWAESSERKUNDLICHE BEOBACHTUNGEN UND UNTERSUCHUNGEN AN EINEM BIOTOP DES /HEMIGRAMMUS LUNATUS/, DES /H. OCELLIFER/, DER /CARNEGIELLA STRIGATA/ UND DER /C. MARTHAE/ (PISCES, CHARACIDAE-GASTEROPELECIDAE) BEI IQUITOS (OSTPERU). [SCIENTIFIC RESULTS OF THE PERU-EXPEDITION DR. K. H. LULING 1972 AND THE BRASILIAN-PERU-EXPEDITION 1974: ICHTHYOLOGICAL AND CHEMICAL OBSERVATIONS AND RESEARCHES OF THE BIOTOPE /HEMIGRAMMUS LUNATUS/, /H. OCELLIFER/, /CARNEGIELLA STRIGATA/ AND /C. MARTHAE/ (PISCES, CHARACIDAE-GASTEROPELECIDAE) NEAR IQUITOS (EASTERN PERU).] Zool. Anz. 201 (1/2): 119-128. 1978. In German with English summ. SFA 24(1)
[Mus. Alexander Konig, Adenauerallee 150-164, D-5300 Bonn 1, West Germany]

79-000485 Marshall, C. L. THE DISTRIBUTION OF /NOTROPIS BAIRDI/ ALONG THE CIMARRON RIVER IN LOGAN COUNTY, OKLAHOMA. Proc. Okla. Acad. Sci. 58: 109. 1978. SFA 24(1)
[Okla. City-Cty. Health Dep., Oklahoma City]

79-000486 Miller, L. G. NEW DISTRIBUTIONAL RECORDS FOR THE ROSYSIDE DACE IN KENTUCKY. Trans. Ky. Acad. Sci. 39 (3-4): 142-144. Sept. 1978. SFA 24(1)
[Hunter Hancock Biol. Stn., Dep. Biol. Sci., Murray State Univ., Murray, KY 42071] The distribution of the rosyside dace /Clinostomus funduloides/ includes the Tennessee River drainage of Kentucky. In view of collection records, the Blood River drainage of eastern Calloway County, Kentucky, appears tc mark the farthest downstream distribution of the rosyside dace in the Tennessee River system. Information pertaining to ecology and associated species is also

79-000486 CONTINUED
presented.

79-000487 Ostroumov, A. G. THE KOKANEE, /ONCORHYNCHUS NERKA KENNERLYI/, IN THE VOROVSKAYA RIVER BASIN (WESTERN KAMCHATKA). J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (5): 794-796. 1978. SFA 24(1)
[TINRO, Petropavlovsk-Kamchatskiy, USSR]

79-000488 Permitin, Yu. Ye. SPECIES COMPOSITION AND ZOOGEOGRAPHICAL ANALYSIS OF THE BOTTOM FISH FAUNA OF THE SCOTIA SEA. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (5): 710-726. 1978. SFA 24(1)
[VNIRO, Moscow, USSR]

79-000489 Pigg, J. THE TILAPIA /SAROTHERODON AUREA/ (STEINDACHNER) IN THE NORTH CANADIAN RIVER IN CENTRAL OKLAHOMA. Proc. Okla. Acad. Sci. 58: 111-112. 1978. SFA 24(1)
[Moore High Sch., Moore, OK]

79-000490 Roarabaugh, D.; Ellis, R. H. DISTRIBUTION AND ABUNDANCE OF BENTHIC MACROINVERTEBRATES IN THE LOCKPORT-ROCHESTER SECTION OF THE NEW YORK STATE BARGE CANAL. Proc. Rochester Acad. Sci. Inc. 13 (1): 24. Oct. 1976. Abstract only. SFA 24(1)
[State Univ. Coll., Brockport, NY]

79-000491 Shen, S.-C.; Choi, Y.-H. ECOLOGICAL AND MORPHOLOGICAL STUDY ON FISH-FAUNA FROM THE WATERS AROUND TAIWAN AND ITS ADJACENT ISLANDS. 16. STUDY ON THE LABRID FISHES (LABRIDAE). Rep. Inst. Fish. Biol. Minist. Econ. Aff. Natl. Taiwan Univ. 3 (3): 68-126. Aug. 1978. SFA 24(1)

79-000492 Thom, R. H. RARE AND ENDANGERED VERTEBRATES OF ILLINOIS. Trans. Ill. State Acad. Sci. 70 (2): 214. 1977. Abstract only. SFA 24(1)
[Ill. Nat. Pres. Comm., Rockford 61103] this paper discusses the methodology and terminology for development of a state list of the Endangered, Vulnerable, and Rare Vertebrates of Illinois with brief comments on the status of some species. A proposed inventory of illinois' rare and endangered species is discussed and the state of the knowledge reviewed. Recommendations are presented for a comprehensive program on Illinois' rare and endangered species.

79-000493 Tyler, J. D.; Mills, D. R. RANGE EXTENSION OF /HIODON ALOSOIDES/ (RAFINESQUE) IN OKLAHOMA. Proc. Okla. Acad. Sci. 58: 113. 1978. SFA 24(1)
[Dep. Biol. Sci., Cameron Univ., Lawton, OK]

79-000494 Wenner, C. A. MAKING A LIVING ON THE CONTINENTAL SLOPE AND IN THE DEEP-SEA: LIFE HISTORY OF SOME DOMINANT FISHES OF THE NORFOLK CANYON AREA. Ph.D. dissertation, Coll. William and Mary in Va. 317p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(5):2179. Nov. 1978. SFA 24(1)

79-000495 Went, A. E. J. TRIGGER OR FILE-FISH (/BALISTES CAROLINENSIS/) IN IRISH WATERS. J. Fish Biol. 13 (4): 489-492. Oct. 1978. SFA 24(1)
[46 Castlepark Rd., Sandycove, Co. Dublin, Ireland]

79-000496 White, E. I. THE LARGER ARTHRODIRAN FISHES FROM THE AREA OF THE BURRINJUCK DAM, N.S.W. Trans. Zool. Soc. Lond. 34 (2): 149-262. July 1978. SFA 24(1)
[Dep. Geol., Univ. Reading, England]

79-000497 Winterbottom, R. RANGE EXTENSIONS AND ADDITIONS TO THE SOUTH AFRICAN MARINE ICHTHYOFAUNA, WITH THE DESCRIPTION OF A NEW SPECIES OF CONGROGADID FROM KWAZULU. Zool. Afr. 13 (1): 41-56. 1978. SFA 24(1)
[Royal Ontairo Mus., 100 Queen's Park, Toronto, ON, Canada]

ABUNDANCE, FACTORS OF; SURVIVAL AND MORTALITY

79-000498 Berenbeym, D. Ya.; Shapiro, L. S. THE INFLUENCE OF HYDROLOGIC FACTORS ON SIZE OF CATCHES OF THE BALTIC HERRING, /CLUPEA HARENGUS MEMBRAS/ FROM VISTULA BAY IN THE BALTIC SEA. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (5): 817-820. 1978. SFA 24(1)
[Atlant-NIRO, Kaliningrad, USSR]

79-000499 Bryantsev, V. A.; Kostyuchenko, V. A. ABIOTIC INDICES OF THE ABUNDANCE OF THE BLACK SEA SCAD, /TRACHURUS MEDITERRANEUS PONTICUS/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (6): 959-961. 1977. SFA 24(1)
[AzCherNIRO, Kerch, USSR]

79-000500 Heard, W. R. PROBABLE CASE OF STREAMBED OVERSEEDING--1967 PINK SALMON, /ONCORHYNCHUS GORBUSCHA/, SPAWNERS AND SURVIVAL OF THEIR PROGENY IN SASHIN CREEK, SOUTHEASTERN ALASKA. NOAA Fish. Bull. 76 (3): 569-582. July 1978. SFA 24(1)
[NMFS, P.O. Box 155, Auke Bay, AK 99821] The 1967 escapement of 38,067 pink salmon, /Oncorhynchus gorbuscha/, to Sashin Creek, southeastern Alaska, was the largest since 1942. Studies on distribution and density of spawners and freshwater survival of their progeny indicated that deposition of excessive numbers of eggs caused a severe compensatory mortality of alevins during winter. Spawner density was 1.7, 1.6, and 1.2 females/m^2 in upper, middle, and lower study areas respectively. The greater density of spawners in the upper area in the odd-numbered years may be determined by genetic factors like timing of escapements and by greater marine survival of fry from the upper area. Based on the previously consistent relation between timing of adult entry and resulting freshwater survival, 1967 spawners should have produced 8 million fry rather than the 3 million that were produced. Mortality of eggs and alevins was high during spawning, low between spawning and hatching, and high between hatching and emergence. Between 1 December 1967 and 25 March 1968, 11.1 million eggs or alevins, 10.7 million of which were alive on 1 December, dissappeared within the streambed. Initial mortality of these progeny probably occurred in the early alevin stage from oxygen privation, whereas disappearance was probably related to rapid decomposition and invertebrate scavenging. A "snowball effect" is postulated whereby alevins that die shortly after hatching place increasing demands on

79-000500 CONTINUED
available oxygen, causing accelerated mortality. A review of historical patterns of fry production in Sashin Creek indicates that streambed overseeding occurred in 1967.

79-000501 Peterman, R. M. TESTING FOR DENSITY-DEPENDENT MARINE SURVIVAL IN PACIFIC SALMONIDS. J. Fish. Res. Board Can. 35 (11): 1434-1450. Nov. 1978. In English with French summ. SFA 24(1)
[Inst. Anim. Resour. Ecol., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada]

79-000502 Saiki, M. K.; Tash, J. C. UNUSUAL POPULATION DYNAMICS IN LARGEMOUTH BASS, /MICROPTERUS SALMOIDES/ (LACEPEDE), CAUSED BY A SEASONALLY FLUCTUATING FOOD SUPPLY. Am. Midl. Nat. 100 (1): 116-125. July 1978. SFA 24(1)
[Ariz. Coop. Fish. Res. Unit, Univ. Ariz., Tucson 85721] This study documents a rare instance of massive natural mortalities among 2-year-old largemouth bass (/Micropterus salmoides/) in Deer Island Lake, a small backwater of the Lower Colorado River. Each spring, adult threadfin shad (/Dorosoma petenense/) immigrate into Deer Island Lake from the river. These shad spawn and their young temporarily increase the trophic carrying capacity for piscivorous bass. In the spring and summer of 1973, yearling (1972 year-class) bass grew rapidly while feeding on the abundant young shad. When all sizes of shad became scarce in the autumn and winter, these bass switched to an inadequate supply of crayfish and bluegill (/Lepomis macrochirus/) forage. Although fry and adult shad were again abundant in the spring of 1974, they were either too small to provide acceptable forage or too large for consumption by the (now 2-year-old) bass. Rising water temperatures between May and June increased the metabolic requirements of these bass resulting in their deaths presumably from starvation.

79-000503 Ware, F. J.; Gasaway, R. D. EFFECTS OF GRASS CARP ON NATIVE FISH POPULATIONS IN TWO FLORIDA LAKES. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 324-335. 1976[1978]. SFA 24(1)
[Fla. Game Fresh Water Fish Comm., Lake Wales] Two natural ponds were studied to investigate the effects of introduced grass carp on native fishes. Biologically significant deleterious effects were determined for both fish populations. Largemouth bass populations were reduced in one pond and substantially altered at the second site. Fish population structures shifted and symptoms of overcrowding were evident. Bluegill numbers increased in both ponds. Warmouth were greatly reduced in one pond. Several species of forage fishes were eliminated.

IDENTIFICATION, KEYS, CLASSIFICATION

79-000504 Barbour, C. D.; Miller, R. R. A REVISION OF THE MEXICAN CYPRINID FISH GENUS /ALGANSEA/. Mus. Zool. Univ. Mich. Misc. Publ. No. 155. 72p. 4 Aug. 1978. SFA 24(1)
[Dep. Biol. Sci., Wright State Univ., Dayton, OH 45435]

79-000505 Borodulina, O. D. A NEW SPECIES OF HATCHETFISH, /STERNOPTYX PSEUDODIAPHANA/ (STERNOPTYCHIDAE, OSTEICHTHYES) FROM THE WATERS OF THE SOUTHERN HEMISPHERE. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (5): 791-794. 1978. SFA 24(1)
[IOAN, Moscow, USSR]

79-000506 Burr, B. M. SYSTEMATICS OF THE PERCID FISHES OF THE SUBGENUS /MICROPERCA/, GENUS /ETHEOSTOMA/. Bull Ala. Mus. Nat. Hist. No. 4. 53p. 31 July 1978. SFA 24(1)
[Dep. Zool., South. Ill. Univ., Carbondale 62901]

79-000507 Buth, D. G. BIOCHEMICAL SYSTEMATICS OF THE MOXOSTOMATINI (CYPRINIFORMES, CATOSTOMIDAE). Ph.D. dissertation, Univ. Ill. 198p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(5):2170. Nov. 1978. SFA 24(1)

79-000508 Chao, L. N. A BASIS FOR CLASSIFYING WESTERN ATLANTIC SCIAENIDAE (TELEOSTEI: PERCIFORMES). NOAA Tech. Rep. NMFS Circ. 415. v + 64p. Sept. 1978. SFA 24(1)
[Fundacao Univ. do Rio Grande Base Oceanogr. Atl., Caixa Postal 474, 96.200 - Rio Grande - RS, Brazil]

79-000509 Fursa, T. I. /CYNOGLOSSUS LIDA/ LARVAE FROM THE ARABIAN SEA. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (6): 962-964. 1977. SFA 24(1)
[AzCherNIRO, Kerch, USSR]

79-000510 Leis, J. M. SYSTEMATICS AND ZOOGEOGRAPHY OF THE PORCUPINEFISHES (/DIODON/, DIODONTIDAE, TETRAODONTIFORMES), WITH COMMENTS ON EGG AND LARVAL DEVELOPMENT. NOAA Fish. Bull. 76 (3): 535-567. July 1978. SFA 24(1)
[Mar. Ecol. Consult., 533 Stevens Ave., Solana, CA 92705] The porcupinefish genus /Diodon/ is composed of five species: /D. hystrix/ Linnaeus and /D. eydouxii/ Brissout de Barneville are closely related species, each of which has a relatively elongate body, Spines on the caudal peduncle, and high dorsal and anal fin ray counts; /D. holocanthus/ Linnaeus and /D. liturosus/ Shaw form a second species pair, each of which has a round body, no caudal peduncle spines, and moderate dorsal and anal fin ray counts; /D. nichtemerus/ Cuvier is a round-bodied species but differs from /D. holocanthus/ and /D. liturosus/ in meristic characters and spination. /Diodon hystrix/, /D. holocanthus/, and /D. eydouxii/ are distributed circumtropically. The Atlantic population of /D. holocanthus/ has diverged from the Indo-Pacific (including eastern Pacific) populations. /Diodon eydouxii/ is pelagic, and both /D. hystrix/ and /D. holocanthus/ have pelagic juvenile stages. /Diodon liturosus/ is found in the Indo-West Pacific, and /D. nicthemerus/ is limited to Tasmania and southern Australia. It is not known whether the latter species have pelagic stages. The egg and larval stages of /D hystrix/ and /D. holocanthus/ (the latter identified by rearing) are similar. The pelagic eggs are 1.6-2.1 mm in diameter and hatch in about 5 days at 25°C. The larvae metamorphose to spiny juveniles at ca. 4 mm in about 3 wk. Both species have pelagic juvenile stages of long duration: /D. hystrix/ remains pelagic to ca. 200 mm standard length, thus providing ample time for dispersal. Eggs and larvae of the other species are unknown.

79-000511 McAllister, D. E.; Smith, C. L. MENSURATIONS MORPHOLOGIQUES, DENOMBREMENTS MERISTIQUES ET TAXONOMIE DU COELANCANTHE, /LATIMERIA CHALUMNAE/. [MORPHOLOGICAL MEASUREMENTS, MERISTIC NUMBERS AND TAXONOMY OF THE COELACANTH, /LATIMERIA CHALUMNAE/.] Nat. Can. (Que.) 105 (2): 63-76. Mar.-Apr. 1978. In French with English summ. SFA 24(1)
[Mus. Sci. Nat., Mus. Natl. Can., Ottawa, Ontario K1A 0M8, Canada]

79-000512 Peden, A. E.; Anderson, M. E. A SYSTEMATIC REVIEW OF THE FISH GENUS /LYCODAPUS/ (ZOARCIDAE) WITH DESCRIPTIONS OF TWO NEW SPECIES. Can. J. Zool. 56 (9): 1925-1961. Sept. 1978. In English with French summ. SFA 24(1)
[British Columbia Prov. Mus., Victoria, BC V8V 1X4, Canada]

79-000513 Randall, J. E.; Ormond, R. F. G. ON THE RED SEA PARROTFISHES OF FORSSKAL, /SCARUS PSITTACUS/ AND /S. FERRUGINEUS/. Zool. J. Linn. Soc. 63 (3): 239-248. July 1978. SFA 24(1)
[Bernice P. Bishop Mus., Honolulu, HI]

79-000514 Snyder, D. E.; Douglas, S. C. DESCRIPTION AND IDENTIFICATION OF MOONEYE, /HIODON TERGISUS/, PROTOLARVAE. Trans. Am. Fish. Soc. 107 (4): 590-594. July 1978. SFA 24(1)
[Dep. Fish. Wildl. Biol., Colo. State Univ., Fort Collins 80523]

79-000515 Yefremenko, V. N. MORPHOLOGICAL FEATURES OF THE LARVAE OF /GYMNOSCOPELUS OPISTHOPTERUS/ (MYCTOPHIDAE, PISCES). J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (5): 797-799. 1978. SFA 24(1)
[VNIRO, Moscow, USSR]

PARASITES AND DISEASES-GENERAL

79-000516 Chinniah, V. C.; Threlfall, W. METAZOAN PARASITES OF FISH FROM THE SMALLWOOD RESERVOIR, LABRADOR, CANADA. J. Fish Biol. 13 (2): 203-213. Aug. 1978. SFA 24(1)
[Dep. Biol., Memorial Univ., St. John's, NF A1B 3X9, Canada]

79-000517 Corazza, L. A REVIEW OF IMMUNOLOGY OF FISH AND SHELLFISH AND IMPLICATIONS FOR AQUACULTURE. Riv. It. Piscic. Ittiop. 13 (2): 41-48. Apr.-May-June 1978. In English and Italian. SFA 24(1)
[Dep. Nat. Resour., Cornell Univ., Fernow Hall, Ithaca, NY 14853]
The increased use of fish as laboratory animals will be beneficial--either directly or indirectly--to aquaculture. Fish diseases are of paramount importance and new methods of control and treatment must be investigated. Management of infectious diseases can be approached from several sides: (1) preventions of contact between pathogen and host; (2) increased natural or genetic resistance; (3) manipulation of environmental factors to create intolerable conditions for the parasite; (4) prophylactic use of chemicals; (5) therapy after the disease occurs; (6) immunization. The immunological responses of fish are widely documented and, even though they seem to follow phylogenetic lines, the responses appear to differ from those of higher vertebrates only quantitatively. Practical and economical considerations, and the danger of developing resistant strains of bacteria, will often discourage the use of chemotherapy as a therapeutic or prophylactic measure. Future development of aquaculture

79-000517 CONTINUED
is linked not only to a better understanding of environmental requirements and hygiene practices, but also to developing an effective and economical means of disease control, of which vaccination is the most promising.

79-000518 Kennedy, C. R. AN ANALYSIS OF THE METAZOAN PARASITOCOENOSES OF BROWN TROUT /SALMO TRUTTA/ FROM BRITISH LAKES. J. Fish Biol. 13 (2): 255-263. Aug. 1978. SFA 24(1)
[Dep. Biol. Sci., The University, Exeter, England] The composition of the parasite fauna of brown trout /Salmo trutta/ in nine British lakes from varying geographical locations has been analysed with regard to several selected physico-chemical parameters of the lakes. Significant correlations existed between the size of the lake and the number of parasite species harboured by trout and between the altitude of the lake and the number of parasite species present. No significant relationships were found between the number of parasite species and the geographical position, age, degree of isolation or CaCO(3) levels of the lakes. Similarly no relationships existed between the proportions of the parasites with different life cycles and the parameters examined, or between the presence or absence of a particular species of parasite and the lake's limnological features. It is concluded that the parasites of brown trout have been, and still are, capable of rapid and widespread dissemination throughout mainland Britain, and their occurrence in any lake is a result of the combination of a number of local factors. The predictive value of the conclusions is tested and discussed with special reference to the parasite fauna of trout in reservoirs.

79-000519 Kennedy, C. R. THE PARASITE FAUNA OF RESIDENT CHAR /SALVELINUS ALPINUS/ FROM ARCTIC ISLANDS, WITH SPECIAL REFERENCE TO BEAR ISLAND. J. Fish Biol. 13 (4): 457-466. Oct. 1978. SFA 24(1)
[Dep. Biol. Sci., The University, Exter, England] Samples of resident freshwater char, /Salvelinus alpinus/ were obtained from three lakes on Bjornoya and their parasite fauna examined. Comparison of the species composition, number, diversity and equitability of the parasite faunas of Bjornoya with those of other Arctic islands, an inshore island and lakes on the Norwegian mainland indicated that the communities on Bjornoya formed a distinct unit with a high degree of similarity between the three lakes. Small differences could be related to differences in the ecology of the lakes. The parasite community of char on Spitsbergen showed the greatest similarity to that on Bjornoya, and the communities of char in mainland lakes the least. Species number and diversity of parasites were often higher on the Arctic islands than on the mainland, and did not correlate with island size or distance from the mainland. The island parasite communities were often dominated by a single species, but a similar situation was also observed in the mainland lakes. It is concluded that the parasite fauna of char on offshore Arctic islands does not agree well with the predictions of island biogeographical theory.

79-000520 McKenzie, K.; McVicar, A. H.; Waddell, I. F. SOME PARASITES OF PLAICE /PLEURONECTES PLATESSA/ L. IN THREE DIFFERENT FARM ENVIRONMENTS. Scott. Fish. Res. Rep. No. 4. 14p. 1976. SFA 24(1)
[Mar. Lab., Aberdeen, Scotland]

79-000521 Olson, R. E. PARASITOLOGY OF THE ENGLISH SOLE, /PAROPHRYS VETULUS/ GIRARD IN OREGON, U.S.A. J. Fish Biol. 13 (2): 237-248. Aug. 1978. SFA 24(1)
[Dep. Zool., Oreg. State Univ., Mar. Sci. Cent., Newport 97365]

79-000522 Rickards, W. L. , (ed.) A DIAGNOSTIC MANUAL OF EEL DISEASES OCCURRING UNDER CULTURE CONDITIONS IN JAPAN. Sea Grant Publ. UNC-SG-78-06. iii + 89p. May 1978. Available at $9.00 from UNC Sea Grant, 105 1911 Bldg., N.C. State Univ., Raleigh 27650. SFA 24(1)

BACTERIAL DISEASES

79-000523 Becker, C. D.; Fujihara, M. P. THE BACTERIAL PATHOGEN /FLEXIBACTER COLUMNARIS/ AND ITS EPIZOOTIOLOGY AMONG COLUMBIA RIVER FISH. A REVIEW AND SYNTHESIS. Am. Fish. Soc. Monogr. No. 2. 92p. 1978. Available at $5.00 from American Fisheries Society, 5410 Grosvenor Lane, Bethesda, MD 20014. SFA 24(1)
[Battelle Memorial Inst., Pac. Norhtwest Lab., Richland, WA 99352]

79-000524 Hazen, T. C.; Raker, M. L.; Esch, G. W.; Fliermans, C. B. ULTRASTRUCTURE OF RED-SORE LESIONS ON LARGEMOUTH BASS (/MICROPTERUS SALMOIDES/): ASSOCIATION OF THE CILIATE /EPISTYLIS/ SP. AND THE BACTERIUM /AEROMONAS HYDROPHILA. J. Protozoól. 25 (3, Part 2): 351-355. Aug. 1978. SFA 24(1)
[Dep. Biol. Wake Forest Univ., Winston-Salem, NC 27109]

79-000525 Lewis, D. H.; Udey, L. R. MENINGITIS IN FISH CAUSED BY AN ASPOROGENOUS ANAEROBIC BACTERIUM. U.S. Fish Wildl. Serv. Fish. Dis. Leafl. 56. 5p. 1978. SFA 24(1)
[Dep. Vet. Microbiol., Tex. Agric. Exp. Stn., Tex. A&M Univ., College Station 77843]

79-000526 Li, M. F.; Traxler, G. S.; Clyburne, S. HISTOPATHOLOGICAL AND HEMATOLOGICAL CHANGES IN MUMMICHOGS, /FUNDULUS HETEROCLITUS/, INFECTED BY A PSEUDOMONAD. J. Fish. Res. Board Can. 35 (10): 1376-1381. Oct. 1978. In English with French summ. SFA 24(1)
[Dep. Fish. Environ., Halifax Lab., Halifax, NS B3J 2S7, Canada]

79-000527 Snieszko, S. F. MYCOBACTERIOSIS (TUBERCULOSIS) OF FISHES. U.S. Fish Wildl. Serv. Fish Dis. Leafl. 55. 9p. 1978. SFA 24(1)
[U.S. FWS, Natl. Fish. Cent., Kearneysville, WV 25430]

79-000528 Young, C. L.; Chapman, G. B. ULTRASTRUCTURAL ASPECTS OF THE CAUSATIVE AGENT AND RENAL HISTOPATHOLOGY OF BACTERIAL KIDNEY DISEASE IN BROOK TROUT (/SALVELINUS FONTINALIS/). J. Fish. Res. Board Can. 35 (9): 1234-1248. Sept. 1978. In English with French summ. SFA 24(1)
[Natl. Biomed. Res. Found., Georgetown Univ., Washington, DC 20007]

PROTOZOAN DISEASES

79-000529 Chapman, W. R.; Harris, F. A.; Miller, R. W. INCIDENCE AND SEASONAL VARIATIONS OF /EPISTYLIS/ AMONG FISHES IN NORTH CAROLINA RESERVOIRS. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 269-275. 1976[1978]. SFA 24(1)
[Div. Inland Fish., N. Car. Wildl. Resour. Comm., Raleigh 27611] /Epistylis/ infections were found on 16 fish species in the Yadkin and Catawba River reservoirs in North Carolina during 1974-75. Families most affected were Ictaluridae, Percichthyidae, and Centrarchidae. Highest incidence of the disease occurred during the summer and fall months. The most common infection site among most species of fishes was inside the mouth. A positive correlation was found between total fish length and /Epistylis/ infection rate among /Lepomis auritus/, /Lepomis macrochirus/, and /Micropterus salmoides/. The bacterium, /Aeromonas hydrophila/, often was isolated from /Epistylis/-infected fishes and was believed responsible for two large fish kills.

79-000530 Desser, S. S.; Paterson, W. B. ULTRASTRUCTURAL AND CYTOCHEMICAL OBSERVATIONS ON SPOROGENESIS OF /MYXOBOLUS/ SP. (MYXOSPORIDA: MYXOBOLIDAE) FROM THE COMMON SHINER /NOTROPIS CORNUTUS/. J. Protozool. 25 (3, Part 2): 314-326. Aug. 1978. SFA 24(1)
[Dep. Microbiol. Parasitol., Fac. Med., Univ. Toronto, Toronto, ON M5S 1A1, Canada]

79-000531 Ferguson, H. W.; Campbell, J. N.; Ghittino, P.; Andruetto, S. ULTRASTRUCTURE OF AN AMOEBA ASSOCIATED WITH PROLIFERATIVE KIDNEY DISEASE IN RAINBOW TROUT (/SALMO GAIRDNERI/). Riv. It. Piscic. Ittiop. 13 (3): 79-85. July-Aug.-Sept. 1978. In English and Italian. SFA 24(1)
[Vet. Res. Lab., Stormont, Belfast, Northern Ireland]

79-000532 Ghittino, P.; Vigliani, E.; Andruetto, S. CASO DI ITTERO DELLA TROTA FARIO IN ITALIA. [A CASE REPORT OF BROWN TROUT JAUNDICE IN ITALY.] Riv. It. Piscic. Ittiop. 13 (3): 89-92. July-Aug.-Sept. 1978. In Italian with English summ. SFA 24(1)
[Via Bologna, 148 - 10154 Torino, Italy] The authors report a slight mortality observed in farmed brown trout (/Salmo trutta/) and attributed it to a parasitosis in the gall bladder by /Chloromyxum truttae/ and /Myxidium truttae/. A jaundice was hypothetically linked with these biliar sporozoan. Histopathologically, the liver was positive for a slight Liver Lipoid Degeneration, which might make worse the observed parasitosis. A survey aiming to establish the incidence of the parasitosis in wild and farmed brown trout in Italy should be interesting for programming a viable rearing of this salmonid, so wanted in sport fishery.

79-000533 Ghittino, P.; Vigliani, E. LA MIXOSOMIASI DELIA TROTA: UNA VECCHIA PARASSITOSI D'IMPORTANZA ATTUALE. [TROUT WHIRLING DISEASE: AN OLD PARASITOSIS OF PRESENT IMPORTANCE.] Riv. It. Piscic. Ittiop. 13 (2): 49-58. Apr.-May-June 1978. In Italian with English summ. SFA 24(1)
[Ist. Zooprof. Piemonte, Liguria, Valle d'Aosta, Via Bologna, 148-10154 Torino, Italy]

79-000534 Griffin, B. R.; Davis, E. M. /MYXOSOMA CEREBRALIS/: DETECTION OF CIRCULATING ANTIBODIES IN INFECTED RAINBOW TROUT (/SALMO GAIRDNERI/). J. Fish. Res. Board Can. 35 (9): 1186-1190. Sept. 1978. In English with French summ. SFA 24(1)
[U.S. FWS, Natl. Fish. Cent., Kearneysville, WV 25430]

VIRAL DISEASES

79-000535 Koment, R. W.; Haines, H. DECREASED ANTIVIRAL EFFECT OF PHOSPHONOACETIC ACID ON THE POIKILOTHERMIC HERPESVIRUS OF CHANNEL CATFISH DISEASE. Proc. Sov. Exp. Biol. Med. 159 (1): 21-24. Oct. 1978. SFA 24(1)
[Dr. H. Haines: Dep. Pathol., Univ. Miami Sch. Med., P.O. Box 528075, Miami, FL 33152]

79-000536 Reno, P. W.; Darley, S.; Savan, M. INFECTIOUS PANCREATIC NECROSIS: EXPERIMENTAL INDUCTION OF A CARRIER STATE IN TROUT. J. Fish. Res. Board Can. 35 (11): 1451-1456. Nov. 1978. In English with French summ. SFA 24(1)
[M. Savan: Dep. Vet. Microbiol. Immunol., Univ. Guelph, Guelph, ON N1G 2W1, Canada]

OTHER DISEASES AND PARASITES

79-000537 Berra, T. M.; Au, R.-J. INCIDENCE OF BLACK SPOT DISEASE IN FISHES IN CEDAR FORK CREEK, OHIO. Ohio J. Sci. 78 (6): 318-322. Nov. 1978. SFA 24(1)
[Dep. Zool., Ohio State Univ., Mansfield 44906] A total of 4175 fishes belonging to 29 taxa in 6 families was examined for black spot disease. Of that total, 89 percent were infected with one or more metacercariae of the strigeid fluke, /Uvulifer ambloplitis/. /Rhinichthys atratulus/, /Semotilus atromaculatus/ and /Campostoma anomalum/ had the highest incidence of infection and the greatest number of individual parasites. Other pool-dwelling minnows such as /Notropis cornutus/ and /Pimephales notatus/ were also heavily infected, whereas /Notropis photogenus/, which prefers deep, swift riffles, had very few cysts. The only non-minnow to approach the high totals of the pool-dwelling cyprinids were /Catostomus commersoni/ and /Etheostoma nigrum/. /Hypentelium nigricans/, which prefers faster water than /Catostomus/ and three species of /Etheostoma/, which, unlike /E. nigrum/, are riffle dwelling forms, also had lower incidences of infection and fewer cysts. /Cottus bairdi/, another rapid water species, did not develop black spot disease. Only 1 specimen of 225 /Ericymba buccata/, which occur over shifting, sandy bottoms, had a single cyst. Our data suggest that the species which inhabit the slower flowing waters of a stream are likely to be more heavily infected than their relatives which prefer faster water because snail hosts are absent and any cercariae present are more likely to be swept away in rapid water and thus have less of a chance to penetrate a host.

79-000538 Boonyaratpalin, S. EFFECT OF MEBENDAZOLE ON THE PLEROCERCOID OF THE BASS TAPEWORM IN LARGEMOUTH BASS. Ph.D. dissertation, Auburn Univ. 76p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(3):1159. Sept. 1978. SFA 24(1)

79-000539 Bortone, S. A.; Bradley, W. K.; Oglesby, J. L. THE HOST-PARASITE RELATIONSHIP OF TWO COPEPOD SPECIES AND TWO FISH SPECIES. J. Fish Biol. 13 (3): 337-350. Sept. 1978. SFA 24(1)
[Fac. Biol., Univ. West Fla., Pensacola 32504] A total of 2494 /Menidia beryllina/ and 717 /M. peninsulae/ (Atherinidae) were examined from the Pensacola Bay area for parasitic copepods. /M. peninsulae/ was infested with /Bomolochus concinnus/ (Bomolochidae) and /Ergasilus manicatus/ (Ergasilidae) and had incidences (and intensities) of 12.3 percent (1.6) and 4.2 percent (1.3), respectively. Only seven /M. peninsulae/ were infested with both species of parasites. /M. Beryllina/ was infested only with /E. manicatus/ and showed different incidences (and intensities) in two areas: Mulatto Bayou, 13.2 percent (1.9); Catfish Basin, 53.0 percent (2.3). Fishes with parasites were significantly longer than fishes without parasites and the case of increasing number of parasites with increasing fish length was reinforced. /B. concinnus/ is a warm water parasite on /M. peninsulae/ while /E. manicatus/ acts as a cold water parasite on /M. peninsulae/ and a warm water parasite on /M. beryllina/. The parasites tended to be overdispersed on their hosts but at the same time showed evidence of negative intraspecific associations within a host. These data suggest intraspecific avoidance by the parasite but active acquisition by the host.

79-000540 Brooks, D. R.; Mayes, M. A. /ACANTHOBOTHRIUM ELECTRICOLUM/ SP. N. AND /A. LINTONI/ GOLDSTEIN, HENSON, AND SCHLICHT 1969 (CESTODA: TETRAPHYLLIDEA) FROM /NARCINE BRASILIENSIS/ (OLFERS) (CHONDRICHTHYES: TORPEDINIDAE) IN COLOMBIA. J. Parasitol. 64 (4): 617-619. Aug. 1978. SFA 24(1)
[Dep. Biol., Univ. Miss., University 38677]

79-000541 Carvajal, J.; Cattan, P. E. OCCURRENCE OF THE PLEROCERCUS OF /GRILLOTIA DOLLFUSI/ CARVAJAL 1971 (CESTODA: TRYPANORHYNCHA) IN THE CHILEAN HAKE /MERLUCCIUS GAYI/ (GUICHENOT 1848). J. Parasitol. 64 (4): 695. Aug. 1978. SFA 24(1)
[Lab. Zool., Inst. Cienc. Biol., Univ. Catolica de Chile, Casilla 114-D, Santiago, Chile]

79-000542 Cressey, R.; Boyle, H. A NEW GENUS AND SPECIES OF PARASITIC COPEPOD (PANDARIDAE) FROM A UNIQUE NEW SHARK. Pac. Sci. 32 (1): 25-30. Jan. 1978. SFA 24(1)
[Smithsonian Inst., Washington, DC 20560] /Dinemoleus indeprensus/ gen. nov., sp. nov. is a new pandarid copepod parasitic on the recently discovered unique shark referred to as "Megamouth". The parasite is intermediate to the genera /Demoleus/ and /Dinemoura/. It differs from members of /Dinemoura/ in having two-segmented rami on legs 2 and 3 rather than three-segmented rami. It is distinguished from /Demoleus/, as the new genus has lamelliform fourth legs.

79-000543 Gupta, N. K.; Kumari, A. ON ONE ALREADY KNOWN BUCEPHALID TREMATODE FROM /XENENTODEN CANCILA/ (A FRESH-WATER FISH) FROM ROPAR (PUNJAB, INDIA). Res. Bull. Panjab Univ. Sci. 24 (3,4): 113-116. Dec. 1973. SFA 24(1)
[Dep. Zool., Panjab Univ., Chandigarh, India]

79-000544 Ho, J.; Dojiri, M. A NEW SPECIES OF /HATSCHEKIA/ (COPEPODA: DICHELESTHIIDAE) PARASITIC ON LEOPARD CORAL TROUT IN THE GREAT BARRIER REEF, AUSTRALIA. J. Parasitol. 64 (4): 727-730. Aug. 1978. SFA 24(1)
[Dep. Biol., Calif. State Univ., Long Beach 90840]

79-000545 Kahn, R. A.; Meyer, M. C. EVIDENCE OF A BI-ANNUAL LIFE CYCLE IN THE MARINE LEECH /OCEANOBDELLA SEXOCULATA/ (HIRUDINEA: PISCICOLIDAE). J. Parasitol. 64 (4): 766-768. Aug. 1978. SFA 24(1)
[Mar. Sci. Res. Lab., Memorial Univ., St. John's, NF A1C 5S7, Canada]

79-000546 Kennedy, C. R.; Broughton, P. F.; Hine, P. M. THE STATUS OF BROWN AND RAINBOW TROUT, /SALMO TRUTTA/ AND /S. GAIRDNERI/ AS HOSTS OF THE ACANTHOCEPHALAN, /POMPHORHYNCHUS LAEVIS/. J. Fish Biol. 13 (2): 265-275. Aug. 1978. SFA 24(1)
[Dep. Biol. Sci., The University, Exeter, England]

79-000547 Mackiewicz, J. S.; Blair, D. BALANOTAENIIDAE FAM. N. AND /BALANOTAENIA NEWGUINENSIS/ SP. N. (CESTOIDEA; CARYOPHYLLIDEA) FROM /TANDANUS/ (SILURIFORMES: PLOTOSIDAE) IN NEW GUINEA. J. Helminthol. 52 (3): 199-203. Sept. 1978. SFA 24(1)
[Dep. Biol. Sci., State Univ. N.Y. Albany 12222]

79-000548 Madhavi, R. LIFE HISTORY OF /GENARCHOPSIS GOPPO/ OZAKI, 1925 (TREMATODA: HEMIURIDAE) FROM THE FRESHWATER FISH /CHANNA PUNCTATA/. J. Helminthol. 52 (3): 251-259. Sept. 1978. SFA 24(1)
[Dep. Zool., Andhra Univ., Waltair 530003, India]

79-000549 Mamaev, Yu. L.; Zubchenko, A. W. [TWO NEW GENERA OF HIGHER MONOGENEANS FROM THE NORTH ATLANTIC.] Zool. Zh. 57 (8): 1131-1139. Aug. 1978. In Russian with English summ. SFA 24(1)
[Inst. Biol. Soil Sci., Far East Sci. Cent. USSR Acad. Sci., Vladivostok, USSR]

79-000550 Mattison, J. A STUDY OF MONOGENETIC TREMATODES PARASITIC ON CONESUS LAKE FISH. Proc. Rochester Acad. Sci. Inc. 13 (1): 34. Oct. 1976. Abstract only. SFA 24(1)
[State Univ. Coll., Geneseo, NY]

79-000551 Mayes, M. A. THE ADULT PLATYHELMINTH PARASITES OF NEBRASKA FISHES. Ph.D. dissertation, Univ. Nebr. (Lincoln) 229p. 1976. From Diss. Abstr. Int. B Sci. Eng. 38(1):98. July 1977. SFA 24(1)

79-000552 Miller, R. L. THE BIOLOGY OF TWO SPECIES OF /ECHINORHYNCHUS/ (ACANTHOCEPHALA) FROM MARINE FISHES IN OREGON. Ph.D. dissertation, Oreg. State Univ. 118p. 1977. From Diss. Abstr. Int. B Sci. Eng. 38(1):99. July 1977. SFA 24(1)

79-000553 Newcomb, T. W. SOME PHYSIOLOGICAL EFFECTS OF TOTAL GAS PRESSURE SUPERSATURATED WATER ON JUVENILE PACIFIC SALMON AND STEELHEAD TROUT: A LABORATORY AND FIELD STUDY. Ph.D. dissertation, Univ. Wash. 183p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(5):2157. Nov. 1978. SFA 24(1)

79-000554 Pearson, J. C.; Margolis, L.; Boyce, N. P. THE METACERCARIA OF /GALACTOSOMUM PHALACROCORACIS/ (TREMATODA: HETEROPHYIDAE) FROM PINK SALMON, /ONCORHYNCHUS GORBUSCHA/, FROM BRITISH COLUMBIA WATERS. Can. J. Zool. 56 (10): 2235-2238. Oct. 1978. In English with French summ. SFA 24(1)
[Dep. Parasitol., Univ. Queensland, St. Lucia, Brisbane, Queensland, Australia 4067]

79-000555 Tallman, C.; Ritter, E. A REDESCRIPTION OF /CORALLOTAENIA MINUTIA/ (FREZE, 1965: CESTODA; PROTEOCEPHALIDEA) FROM ALLEGANY COUNTY, NEW YORK. Proc. Rochester Acad. Sci. Inc. 13 (1): 34. Oct. 1976. Abstract only. SFA 24(1)

79-000556 Uhazy, L. S. LESIONS ASSOCIATED WITH /PHILOMETROIDES HURONENSIS/ (NEMATODA: PHILOMETRIDAE) IN THE WHITE SUCKER (/CATOSTOMUS COMMERSONI/). J. Wildl. Dis. 14 (4): 401-108. Oct. 1978. SFA 24(1)
[Dep. Biol., Univ. Calif., Los Angeles 90024] Lesions associated with /Philometroides huronensis/ in the white sucker (/Catostomus commmersoni/) of southern Ontario occured during the spring (April-June) and were related to the development and release of first-stage larvae from the gravid nematode. With movement of the subgravid female into the membranous region of the fin, subepidermal tissues were mechanically disrupted and compacted near the nematode. Gravid females were encapsulated by fibrous tissue. Release of first-stage larvae from the gravid nematode was facilitated by a cutaneous opening, disruption of the fibrous capsule and rupture of the nematode. An acute local inflammatory response was associated with this function. Spent Nematodes were sequestered and resorbed.

79-000557 Williams, H. H.; Richards, D. H. H. /PROLEPTUS MACKENZIEI/ SP. N. (NEMATODA, SPIRURIDA) FROM /RAJA FYLLAE/ IN THE BARENTS SEA. Zool. Scr. 7 (2): 85-91. 1978. SFA 24(1)
[Open Univ. Wales, Cardiff, Wales]

79-000558 Yamazaki, F.; Hibino, T.; Oishi, K.; Harada, T. MORPHOLOGICAL CHANGES IN THE X-CELLS IN EPIDERMAL PAPILLOMAS OF THE FLATFISH, /LIMANDA SCHRENKI/. Bull. Jpn. Soc. Sci. Fish. 44 (7): 723-727. July 1978. SFA 24(1)
[Fac. Fish., Hokkaido Univ., Hakodate, Japan] Morphological changes in and the origin of the X-cells were studied in tumors diagnosed as epidermal papillomas of two specimens of /Limanda schrenki/ reared for four months. The X-cells originate from small cells 2-3 um in size, supposed to be wandering in nature, which first appear in the intercellular spaces of the basal layer of the epidermis. The X-cells become recognisable at 4-5 um diameter and gradually swell, accumulating many vacuoles in the cytoplasm. They grow further to 15-

79-000558 CONTINUED
20 um in size and then degenerate.

POLLUTION

79-000559 Alston, D. E. EFFECTS OF HEATED WATER UPON FISH-FOOD ORGANISMS IN THREE ARTIFICIAL CHANNELS. Ph.D. dissertation, Auburn Univ. 62p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(3):1110. Sept. 1978. SFA 24(1)

79-000560 Anonymous TOXIC MATERIALS IN THE AQUATIC ENVIRONMENT. Seminar Conducted by Water Resour. Res. Inst., Oreg. State Univ., Corvallis 165p. July 1978. SFA 24(1)
[Water Resour. Res. Inst., Oreg. State Univ., Corvallis] A collection of papers.--RS

79-000561 Bishop, W. E. THE DISTRIBUTION AND EFFECTS OF SELECTED HEAVY METALS IN A CONTAMINATED LAKE. Ph.D. dissertation, Purdue Univ. 160p. 1976. From Diss. Abstr. Int. B Sci. Eng. 38(2):567. Aug. 1977. SFA 24(1)

79-000562 Bohn, A.; Fallis, B. W. METAL CONCENTRATIONS (AS, CD, CU, PB, AND ZN) IN SHORTHORN SCULPINS, /MYOXOCEPHALUS SCORPIUS/ (LINNAEUS), AND ARCTIC CHAR, /SALVELINUS ALPINUS/ (LINNAEUS), FROM THE VICINITY OF STRATHCONA SOUND, NORTHWEST TERRITORIES. Water Res. 12 (9): 659-663. 1978. SFA 24(1)
[B.C. research, 3650 Wesbrook Mall, Vancouver, BC V6S 2L2, Canada] Concentrations of arsenic, cadmium, copper, lead and zinc were determined in muscle and liver tissues from shorthorn sculpins and landlocked Arctic char collected in the vicinity of Strathcona Sound, N.W.T., prior to industrial activity. The concentration of arsenic in both muscle and liver tissues from shorthorn sculpins displayed a positive correlation to body weight over the entire size range, and substantially exceeded the maximum recommended level for arsenic in marine animal products established by the Canadian Food and Drug Directorate. The concentrations of the other four elements were either not correlated to body weight or else the data were non-linear. No correlation between the metal concentrations and body weight was found in Arctic char.

79-000563 Borsetti, A. P.; Roach, J. A. G. IDENTIFICATION OF KEPONE ALTERATION PRODUCTS IN SOIL AND MULLET. Bull. Environ. Contam. Toxicol. 20 (2): 241-247. Aug. 1978. SFA 24(1)
[Div. Chem. Phys., Food Drug Admin., Washington, DC 20240]

79-000564 Connell, D. W. A KEROSENE-LIKE TAINT IN THE SEA MULLET /MUGIL CEPHALUS/ (LINNEAUS) II. SOME ASPECTS OF THE DEPOSITION AND METABOLISM OF HYDROCARBONS IN MUSCLE TISSUE. Bull. Environ. Contam. Toxicol. 20 (4): 492-498. Oct. 1978. SFA 24(1)
[Sch. Aust. Environ. Stud., Griffith Univ., Nathan, Queensland, Australia 4111]

79-000565 Eidman, M. SPECIES COMPOSITON, ABUNDANCE AND DISTRIBUTION OF MICRO-CRUSTACEANS AND FISHES IN THE INTAKE AREA, DISCHARGE CANAL, AND COOLING LAKE OF THE CEDAR BAYCU ELECTRIC GENERATING STATION, NEAR BAYTOWN, TEXAS. Ph.D. dissertation, Tex. A&M Univ. 349p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(3):1111. Sept. 1978. SFA 24(1)

79-000566 Gannon, J. ACID RAIN FALLOUT: POLLUTION & POLITICS. Natl. Parks Conserv. Mag. 52 (10): 16-21. Oct. 1978. SFA 24(1)

79-000567 Hancock, D. A.; Edmonds, J. S.; Edinger, J. P. MERCURY IN SHARK IN WESTERN AUSTRALIA. A PRELIMINARY REPORT. Fish. Res. Bull. West. Aust. No. 18. 21p. 1977. SFA 24(1)
[Dep. Fish. Wildl., Perth, Western Australia]

79-000568 Hattula, M. L.; Sarkka, J.; Janatuinen, J.; Paasivirta, J; Roos, A. TOTAL MERCURY AND METHYL MERCURY CONTENTS IN FISH FROM LAKE PAIJANNE. Environ. Pollut. 17 (1): 19-29. Sept. 1978. SFA 24(1)
[Dep. Chem., Univ. Jyvaskyla, SF-40100 Jyvaskyla 10, Finland]

79-000569 Hewett, C. J.; Jefferies, D. F. THE ACCUMULATION OF RADIOACTIVE CAESIUM FROM FOOD BY THE PLAICE /PLEURONECTES PLATESSA/ AND THE BROWN TROUT /SALMO TRUTTA/. J. Fish Biol. 13 (2): 143-153. Aug. 1978. SFA 24(1)
[Minist. Agric. Fish. Food, Fish. Radiobiol. Lab., Lowestoft, Suffolk, England] The patterns of accumulation of caesium-137 from food by the tissues and organs of a marine teleost, the plaice /Pleuronectes platessa/ and a freshwater teleost, the brown trout /Salmo trutta/ are described and compared. Estimates of the biological half-times and steady-state concentrations are derived and individual organ intakes calculated. Rate constants are similar to those obtained from the accumulation from water studies. Plaice gut and liver have an 11 percent increase and trout gut a 6 percent increase in their share of the [^{137}Cs] intake arising from accumulation from food, compared with that arising from the accumulation from water. These increases were balanced by decreases in the muscle share of the intake. The overall absorption of [^{137}Cs] from food was 42 percent for plaice and 67 percent for trout.

79-000570 Juul, R. B.; Shireman, J. V. A BIOLOGICAL ASSESSMENT OF FISH AND BENTHIC POPULATIONS INHABITING A KRAFT MILL EFFLUENT CHANNEL. Water Res. 12 (9): 691-701. 1978. SFA 24(1)
[Sch. For. Resour. Conserv., Univ. Fla., Gainesville 32611]

79-000571 Karapetian, J. V.; Shahmoradi, A. M. ARSENIC CONCENTATION IN CANNED TUNA FISH AND SARDINE. Bull. Environ. Contam. Toxicol. 20 (5): 602-605. Nov. 1978. SFA 24(1)
[Dep. Toxicol., Coll. Pharm., Tehran Univ., Tehran, Iran]

79-000572 Klose, P. N. EFFECTS OF A ZINC MINE EFFLUENT ON THE BENTHIC MACROINVERTEBRATE FAUNA OF SAUCON CREEK, LEHIGH AND NORTHAMPTON COUNTIES, PENNSYLVANIA. Ph.D. dissertation, Lehigh Univ. 214p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(3):1113. Sept. 1978. SFA 24(1)

79-000573 Koli, A. K.; Canty, W. T. DETERMINATION OF METHYLMERCURY IN FISH OF SOUTH CAROLINA. Bull. Environ. Contam. Toxicol. 20 (4): 537-543. Oct. 1978. SFA 24(1)
[Dep. Nat. Sci., S.C. State Coll., Orangeburg, 29117]

79-000574 Koli, A. K.; Sandhu, S. S.; Canty, W. T.; Felix, K. L.; Reed, R. J.; Whitmore, R. TRACE METALS IN SOME FISH SPECIES OF SOUTH CAROLINA. Bull. Environ. Contam. Toxicol. 20 (3): 328-331. Sept. 1978. SFA 24(1)
[Dep. Nat. Sci., S.C. State Coll., Orangeburg 29117]

79-000575 Kumagai, H.; Saeki, K. [CONTENTS OF TOTAL MERCURY, ALKYL MERCURY, AND METHYL MERCURY IN SOME COASTAL FISH AND SHELLS.] Bull. Jpn. Soc. Sci. Fish. 44 (7): 807-816. July 1978. In Japanese with English summ. SFA 24(1)
[Yamaguchi Pref. Res. Inst. Health, Aoi, Yamaguchi City 753, Japan]

79-000576 Kumpf, H. E. ECONOMIC IMPACT OF THE EFFECTS OF POLLUTION ON THE COASTAL FISHERIES OF THE ATLANTIC AND GULF OF MEXICO REGIONS OF THE UNITED STATES OF AMERICA. FOA Fish. Tech. Pap. No. 172. vii + 79p. Aug. 1977. SFA 24(1)
[NMFS, Miami, FL]

79-000577 Letterman, R. D.; Mitsch, W. J. IMPACT OF MINE DRAINAGE ON A MOUNTAIN STREAM IN PENNSYLVANIA. Environ. Pollut. 17 (1): 53-73. Sept. 1978. SFA 24(1)
[Pritzker Dep. Environ. Eng., Ill. Inst. Technol., Chicago 60616]
Physicochemical parameters and fish and benthic macroinvertebrate community structure were studied in a small mountain stream in western Pennsylvania. Sampling stations were located upstream and downstream of coal mine drainage in an otherwise unpolluted stream. Due to an alkaline discharge and significant upstream alkalinity the pH below the mine discharges remained between 6.5 and 8. The major factor affecting the benthic community and fish population appeared to be ferric hydroxide deposition. Rates of deposition during dry-weather conditions ranged from 3 g/m²/day near the discharges to 0.01 g/m²/day at the downstream end of the study site. The biomass of macroinvertebrates decreased from approximately 14 g wet wt/m² above the discharges to 0.1-1.5 g wet wt/m² within the area of iron deposition. Invertebrate diversity decreased significantly at the discharge but recovered to 75 percent of upstream values. The low but constant-temperature discharge from the mine may have enhanced the diversity recovery. The standing crop of fish decreased from approximately 228 to 11 kg/ha. Benthic fishes such as sculpin and suckers were the groups most affected.

79-000578 Longley, W. L.; Jackson, R.; Snyder, B. MANAGING OIL AND GAS ACTIVITIES IN COASTAL ENVIRONMENTS. U.S. Fish Wildl. Serv. FWS/OBS-78/54. v + 66p. June 1978. SFA 24(1)
[RPC, Inc., 1705 Guadalupe, Austin, TX 78701]

79-000579 Matsunaga, K. CONCENTRATION OF MERCURY IN MARINE ANIMALS. Bull. Fac. Fish. Hokkaido Univ. 29 (1): 70-74. Mar. 1978. SFA 24(1)
[Lab. Mar. Chem., Fac. Fish., Hokkaido Univ., Hakodate, Japan] About 200 marine animals were divided on the basis of food habit. The concentrations of mercury in them were measured and the mechanism of mercury accumulation was examined. Based on the results, it is likely that mercury accumulation in marine animals depends on food chain amplification.

79-000580 Metcalf, R. L.; Sanborn, J. R. PESTICIDES AND ENVIRONMENTAL QUALITY IN ILLINOIS. Ill. Nat. Hist. Surv. Bull. 31 (9): 381-436. Aug. 1975. SFA 24(1)
[Dep. Biol., Univ. Ill., Urbana]

79-000581 Murphy, B. R.; Atchison, G. J.; McIntosh, A. W.; Kolar, D. J. CADMIUM AND ZINC CONTENT OF FISH FROM AN INDUSTRIALLY CONTAMINATED LAKE. J. Fish Biol. 13 (3): 327-335. Sept. 1978. SFA 24(1)
[Fish. Wildl. Sci., VPI&SU, Blacksburg, VA 24060] Eleven species of fish from an industrially-contaminated lake were analysed for whole body cadmium and zinc content by atomic absorption spectrophotometry. Cadmium and zinc content of fish were species related, and most species accumulated these trace metals to levels significantly higher than background. Maximum concentrations detected were 13.60 ug Cd^{-1} (dry wt) in a bluegill and 820 ug Zn g^{-1} in a redear sunfish. Cadmium content was much more variable than zinc content. Distributions of concentrations of both cadmium and zinc in fish were lognormal, and concentrations of both metals tended to decrease in higher trophic levels. Zinc concentrations significantly decreased as total length increased in three species.

79-000582 Nyberg, P.; Mossberg, P. UTSATTNING AV ORING AV NAGRA OLIKA STAMMAR I SMA, SURA OCH HUMOSA SKOGSSJOAR. [STOCKING BROWN TROUT (/SALMO TRUTTA/ L.) OF DIFFERENT STRAINS IN SMALL, ACID AND HUMIC FOREST LAKES.] Inf. Freshwater Inst. Drottningholm No. 9. 18p. 1978. In Swedish with English summ. SFA 24(1)
[Freshwater Inst., Drottningholm, Sweden] During test-fishing in lakes in a forest region about 200 km NW of Stockholm, two small lakes with a population of brown trout were found. The lakes were brownish and rather acid (pH 4.7-5.4) and it could be possilbe that this trout was adapted for living in small, brown-coloured and acid lakes. Trout were stocked in 7 small (1.2-8.6 ha) brownish (15-160 mg Pt/l) and rather acid (pH 4.8-6.2) lakes. One lake had been treated with rotenone in 1962 and contained no fish at all before stocking. The other six contained more or less stunted populations of perch (/Perca fluviatilis/ L.). The trout strains were all hatchery reared and about one and two years old when stocking. In all but two lakes that special strain was stocked together with trout of another strain. Test-fishing with gillnets during 4-5 periods during the following two years gave no indications that this special strain should be especially adapted for this kind of lakes. On the contrary, recapture of the parallel stocked strain always was better, but the differences were small. Growth rate was very varying and was best in the lake that had been treated with rotenone. When stocking one-year-old trout, it seemed as if this special strain has a lower growth rate than one of the others.

79-000583 Robb, A. E., Jr. A SURVEY OF SELECTED HEAVY METALS IN FISH FROM THE BARGE AND CAYUGA-SENECA CANALS. Proc. Rochester Acad. Sci. Inc. 13 (1): 33. Oct. 1976. Abstract only. SFA 24(1)
[State Univ. Coll., Brockport, NY]

79-000584 Schrader, E. L.; Furbish, W. J. AN AQUECUS AND SEDIMENTALOGICAL MODEL FOR HEAVY METAL CONTAMINATION OF STREAM SYSTEMS AFFECTED BY SULFIDE MINING IN THE EASTERN UNITED STATES. Bull. Environ. Contam. Toxicol. 20 (2): 159-166. Aug. 1978. SFA 24(1)
[Dep. Geol., Duke Univ., Durham, NC 27708]

79-000585 Singh, S. M.; Ferns, P. N. ACCUMULATION OF HEAVY METALS IN RAINBOW TROUT /SALMO GAIRDNERI/ (RICHARDSON) MAINTAINED ON A DIET CONTAINING ACTIVATED SEWAGE SLUDGE. J. Fish Biol. 13 (2): 277-286. Aug. 1978. SFA 24(1)
[Dep. Zool., University Coll., Cathays Park, Cardiff CF1 1XL, Wales] Rainbow trout were fed for 10 weeks with a nutritionally balanced diet containing 30 percent by weight of activiated sewage sludge. The whole body concentrations of nine heavy metals (Cr, Mn, Fe, Co, Ni, Cu, Zn, Cd, Pb), together with four major cations (Ca, Mg, Na, K) were determined at the beginning and end of the experiment and at three intermediate stages. Fish fed on the diet containing sewage sludge had significantly elevated levels of Cr, Fe, Ni, Pb and reduced levels of Na and K compared with controls, though the values obtained for all groups fell within the range reported for uncontaminated fish. The Ni and Zn showed a marked increase towards the end of the experiment, suggesting that they might have continued to rise after 70 days.

79-000586 White, R. W. G.; Williams, W. P. STUDIES OF THE ECOLOGY OF FISH POPULATIONS IN THE RYE MEADS SEWAGE EFFLUENT LAGOONS. J. Fish Biol. 13 (4): 379-400. Oct. 1978. SFA 24(1)
[Dep. Zool., Univ. Tasmania, Box 252C, G.P.O., Hobart, Australia 7001] The ecology of populations of roach, chub and perch in shallow lagoons forming part of a sewage works was studied over a period of two years. The fish were netted, identified, measured and scales taken for ageing, except in the case of perch of which a limited number were killed and their opercular bones collected. The chub and perch grew faster than those from other waters and the growth rate of the roach equalled that of the best European populations. Breeding success was irregular, particularly with the chub, and a relatively low population density and the high potential productivity of the lagoons could explain the rapid growth rate.

79-000587 Woollard, P.; Settle, H. PCB RESIDUES IN MULLET, /MUGIL CEPHALUS/, FED TO CAPTIVE EASTERN AUSTRALIAN WATER RATS, /HYDROMYS CHRYSOGASTER/. Bull. Environ. Contam. Toxicol. 20 (5): 606-612. Nov. 1978. SFA 24(1)
[Div. Wildl. Res., CSIRO, P.O. Box 84, Lyneham, A.C.T. 2602, Australia]

79-000588 Zwick, D.; Silverman, L. ANALYSIS OF THE 1977 CLEAN WATER ACT. Fisheries (Bull. Am. Fish. Soc.) 3 (5): 22-26. Sept.-Oct. 1978. Available for $3.00 plus postage from Clean Water Ocean Project, 1341 G Street, N.W., Washington, DC 20005. SFA 24(1)

TOXICOLOGY; BIOASSAYS

79-000589 Addison, R. F.; Zinck, M. E.; Willis, D. E. INDUCTION OF HEPATIC MIXED-FUNCTION OXIDASE (MFO) ENZYMES IN TROUT (/SALVELINUS FONTINALIS/) BY FEEDING AROCLOR 1254 OR 3-METHYLCHOLANTHRENE. Comp. Biochem. Physiol. C Comp. Pharmacol. 61 (2): 323-325. 1978. SFA 24(1)
[Bedford Inst. Oceanogr., Dartmouth, NS B2Y 4A2, Canada]

79-000590 Alexander, H. C.; McCarty, W. M.; Bartlett, E. A. TOXICITY OF PERCHLOROETHYLENE, TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE, AND METHYLENE CHLORIDE TO FATHEAD MINNOWS. Bull. Environ. Contam. Toxicol. 20 (3): 344-352. Sept. 1978. SFA 24(1)
[Environ. Res. Lab., Dow Chemical Co., Midland, MI]

79-000591 Birkner, J. H. SELENIUM IN AQUATIC ORGANISMS FROM SELENIFEROUS HABITATS. Ph.D. dissertation, Colo. State Univ. 130p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(5):2169. Nov. 1978. SFA 24(1)

79-000592 Carlson, A. R.; Herman, L. J. EFFECT OF LONG-TERM REDUCTION AND DIEL FLUCTUATION IN DISSOLVED OXYGEN ON SPAWNING OF BLACK CRAPPIE, /POMOXIS NIGROMACULATUS/. Trans. Am. Fish. Soc. 107 (5): 742-746. Sept. 1978. SFA 24(1)
[U.S. EPA, Environ. Res. Lab., 6201 Congdon Blvd., Duluth, MN 55804]

79-000593 Collier, T. K.; Thomas, L. C.; Malins, D. C. INFLUENCE OF ENVIRONMENTAL TEMPERATURE ON DISPOSITION OF DIETARY NAPHTHALENE IN COHO SALMON (/ONCORHYNCHUS KISUTCH/): ISOLATION AND IDENTIFICATION OF INDIVIDUAL METABOLITES. Comp. Biochem. Physiol. C Comp. Pharmacol. 61 (1): 23-28. 1978. SFA 24(1)
[NMFS, Seattle, WA 98112]

79-000594 Colt, J. E. THE EFFECTS OF AMMONIA ON THE GROWTH OF CHANNEL CATFISH, /ICTALURUS PUNCTATUS/. Ph.D. dissertation, Univ. Calif. (Davis) 194p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(3): 1061. Sept. 1978. SFA 24(1)
The effect of un-ionized ammonia on the growth of juvenile channel catfish (/Ictalurus punctatus/) was measured in 31 day growth trials conducted at 28°C. Un-ionized ammonia reduced growth in a linear manner over the concentration range of 48 to 989 micrograms/NH(3)-N. On a wet weight basis, growth was reduced by 50 percent at 517 micrograms/liter and no growth occurred at 967 micrograms/liter NH(3)-N. Mortality was increased significantly at 989 micrograms/liter NH(3)-N and above. The no growth un-ionized ammonia level was 60 percent of the 96-hour LC50 value. Above approximately 500 micrograms/liter, there was increasing damage to the dorsal and pectoral fins.

79-000595 Curtis, L. R.; Beyers, R. J. INHIBITION OF OVIPOSITION IN THE TELEOST /ORYZIAS LATIPES/, INDUCED BY SUBACUTE KEPONE EXPOSURE. Comp. Biochem. Physiol. C Comp. Pharmacol. 61 (1): 15-16. 1978. SFA 24(1)

[Dep. Pharmacol. Toxicol., Univ. Miss. Med. Cent., 2500 N. State St., Jackson 39216] The organochlorine pesticide Kepone (chlordecone) has been reported to interfere with avian and mammalian reproduction. Breeding Female /Oryzias latipes/ were exposed to 1 and 2 parts per billion (ppb) Kepone in their aquarium water. Oviposition ceased within 252 hr of treatment in all 1-ppb animals, and within 96 treatment hr at 2 ppb.

79-000596 Darrow, D. C.; Addison, R. F.; Law, F. C. P. DISPOSITION OF DIPHENYL ETHER FOLLOWING INTRAVENOUS ADMINISTRATION TO THORNY SKATE (/RAJA RADIATA/). Comp. Biochem. Physiol. C Comp. Pharmacol. 61 (2): 317-321. 1978. SFA 24(1)

[Bedford Inst. Oceanogr., Dartmouth, NS B2Y 4A2, Canada]

79-000597 Goodman, L. R.; Hansen, D. J.; Couch, J. A.; Forester, J. EFFECTS OF HEPTACHLOR AND TOXAPHENE ON LABORATORY-REARED EMBRYOS AND FRY OF THE SHEEPSHEAD MINNOW. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 192-202. 1976[1978]. SFA 24(1)

[U.S. EPA, Environ. Res. Lab., Gulf Breeze, FL 32561] Flow-through seawater bioassays of 28-days duration were conducted with the organochlorine pesticides heptachlor and toxaphene to determine their toxicity to and bioconcentration by embryos and fry of the sheepshead minnow (/Cyprinodon variegatus/). At technical heptachlor measured concentrations of 4.3, 3.5, 2.2, 2.0, and 1.2 ug/l (ppb), test animal survival was 1, 5, 61, 79 and 88 percent, respectively. At toxaphene measured concentrations of 2.5, 1.1, 0.6, 0.3, and 0.2 ug/l, test animal survival was 10, 85, 79, 88, and 80 percent respectively. Average standard length of fry continuously exposed from fertilization to heptachlor concentrations of 4.3 and 3.5 mg/l was significantly reduced (P=0.01). Concentration factors (concentration in fish/measured concentration in water) for heptachlor averaged 3,600 and for trans-chlordane averaged 8,600. Heptachlor epoxide and cis-chlordane were also present in the fish. Concentration factors for toxaphene in fry averaged 9,800. Various histopathological characteristics not seen in control fish were observed in the liver, kidney, pancreas, and intestine of the few fish that survived 4.3 and 3.5 mg/l of heptachlor.

79-000598 Hara, T. J.; Thompson, B. E. THE REACTION OF WHITEFISH, /COREGONUS CLUPEAFORMIS/, TO THE ANIONIC DETERGENT SODIUM LAURYL SULPHATE AND ITS EFFECTS ON THEIR OLFACTORY REPSONSES. Water Res. 12 (10): 893-897. 1978. SFA 24(1)

[Freshwater Inst., Winnipeg, MB R3T 2N6, Canada] Whitefish, /Coregonus clupeaformis/, were attracted to anionic detergent sodium lauryl sulphate (SLS) at sublethal concentrations, when tested in a trough where a choice between clean and modified water was presented. The olfactory bulbar electrical responses to odourants were depressed when the nares were perfused with SLS and household detergents. The lowest concentration of SLS to cause minimum effects within 15 min was 0.1 mgl^{-1}. Possible modes of action of detergent are discussed.

79-000599 Helmy, M. M.; Lemke, A. E.; Jacob, P. G.; Oostdam, B. L. EFFECTS OF SOME TRACE ELEMENTS ON THE BLOOD OF KUWAIT MULLETS, /LIZA MACROLEPIS/ (SMITH). J. Exp. Mar. Biol. Ecol. 34 (2): 151-161. Sept. 1978. SFA 24(1)
[Mar. Pollut. Prog., Environ. Earth Sci. Div., Kuwait Inst. Sci. Res., Kuwait]

79-000600 Hershberger, W. K.; Bonham, K.; Donaldson, L. R. CHRONIC EXPOSURE OF CHINOOK SALMON EGGS AND ALEVINS TO GAMMA IRRADIATION: EFFECTS ON THEIR RETURN TO FRESHWATER AS ADULTS. Trans. Am. Fish. Soc. 107 (4): 622-631. July 1978. SFA 24(1)
[Coll. Fish., Univ. Wash., Seattle 98195]

79-000601 Hodson, P. V.; Blunt, B. R.; Spry, D. J. CHRONIC TOXICITY OF WATER-BORNE AND DIETARY LEAD TO RAINBOW TROUT (/SALMO GAIRDNERI/) IN LAKE ONTARIO WATER. Water Res. 12 (10): 869-878. 1978. SFA 24(1)
[Great lakes Biolimnol. Lab., Canada Cent. Inland Water, P.O. Box 5050, Burlington, ON L7R 4A6, Canada] Rainbow trout (/Salmo gairdneri/) exposed lead in Lake Ontario water demonstrated a 21-day LC(50) of 2.4mgl^{-1} lead. At lead concentrations ranging fron 3 to 120ugl^{-1}, log(10) of lead concentrations in most tissues of exposed fish appeared linearily related to log (10) of Lead concentrations in water. Highest concentrations occurred in opercular bone followed by gill and kidney. Lead accumulation by brain was not clearly demonstrated. Exposure to lead in water at concentrations as low as 13ugl^{-1} caused significant increases in red blood cell (RBC) numbers, decreases in RBC volumes, decreases in RBC cellular iron content and decreases in RBC sigma-amino levulinic acid dehydratase activity. No changes were observed in hematocrit or whole blood iron content. The changes indicated increased erythropoiesis to compensate for inhibition of hemoglogin production and increased mortality of mature red blood cells. After 32 weeks exposure to 120ugl^{-1} lead in water, 30 percent of remaining fish exhibited black tails, an early indication of spinal deformities. Lead added to food was not avaialbe for for lead uptake by fish. Lead content of fish exposed to dietary lead was not elevated above control levels and the majority of lead consumed could be accounted for in the faeces. Dietary lead may have slightly inhibited uptake of dietary iron.

79-000602 Itazawa, Y.; Koyama, J. [EFFECTS OF ORAL ADMINISTRATION OF CADMIUM ON FISH--III. COMPARISON OF THE EFFECTS ON THE PORGY AND THE CARP.] Bull. Jpn. Soc. Sci. Fish. 44 (8): 891-895. Aug. 1978. SFA 24(1)
[Dep. Fish., Fac. Agric., Kyushu Univ. 46-04, Hakozaki, Higashi-ku, Fukuoka, 812, Japan] Porgy /Pagrus major/ of 73±7 g were fed for 113 days on feed containing Cd of 0, 37.5, 150, or 375ppm in the dry weight. Neither a decrease of the calcium contents of the serum and the vertebrae nor scoliosis, all of which were noticed in carp fed on feed containing Cd≥140ppm for 30 days, was observed in the porgy. The total amount of Cd administered per 100 g of fish through the feeding period was 42.4 mg for porgy fed on 375ppm Cd-feed, and 3.8-5.6 mg for carp fed on 140ppm Cd-feed. The Cd contents of the heptopancreas and the kidney were 146ppm and 164ppm in the porgy, and 14ppm and 52ppm in the carp. The fact that the porgy, a marine teleost, did not suffer from low calcium and vertebral abnormalities, even when they were administered 7-11 times as much Cd as the carp, is considered to be attributable, partly at least, to calcium derived from the environmental medium.

79-000603 Jacobs, G. UEBER AUFNAHAME UND ANREICHERUNG VON SCHWERMETALLSALZEN (HG, CD) AUS FUTTERMITTELN IN REGENBOGENFORELLEN. I. MITTEILUNG. [ABSORPTION AND RETENTION OF MERCURY AND CADMIUM FROM FISH-FEED BY RAINBOW TROUT.] J. Anim. Physiol. Anim. Nutr. 40 (5): 274-284. Aug. 1978. In German with English summ. SFA 24(1)
[Inst. Biochem., Martin Luther King Plaza 6, D-2000 Hambrug 13, West Germany]

79-000604 Jacobs, G. UEBER AUFNAHME UND ANREICHERUNG VON SCHWERMETALLSALZEN (HG, CD) AUS FUTTERMITTELN IN REGENBOGENFORELLEN. [ABSORPTION AND RETENTION OF MERCURY AND CADMIUM FROM FISH-FEED BY RAINBOW TROUT.] J. Anim. Physiol. Anim. Nutr. 40 (5): 274-284. Aug. 1978. SFA 24(1)
[Inst. Biochem., Martin-Luther-King-Platz 6, D-2000 Hamburg 13, West Germany] Rainbow trout (/Salmo gairdneri/) were fed various rations (1-16 ppm) of mercury as methyl-mercury-chloride or mercury-chloride and cadmium as cadmiumchloride. A high level of methyl-mercury in the feed (7 ppm) has been accumulated in eight days up to 1.04 ppm in muscle tissue and after feeding a lower level of 1.02 ppm Hg over two months the mercury content grow up to 0.67 ppm in the tissue, 1.06 ppm in the liver and 1.38 ppm in the kidney. Mercury-chloride has not such a significant effect. The cadmium uptake after feeding 16 ppm Cd over two months is found to be very small in muscle tissue, higher in the liver (0.95 ppm) and kidney (1.32 ppm). Heavy metals (Hg, Cd) poisoning has been demonstrated as an increasing risk to damage skin and fish-tissue.

79-000605 Junqueira, L. C. U.; Salles, L. M. M. EFFECTS OF 6-HYDROXYDOPAMINE AND 5-HYDROXYDOPAMINE ON THE TELEOST MELANOPHORES INNERVATION. J. Fish Biol. 13 (4): 415-419. Oct. 1978. SFA 24(1)
[Dep. Histol., Sao Paulo Univ. Sch. Med., Sao Paulo, Brazil]

79-000606 Kanazawa, J. BIOCONCENTRATION RATIO OF DIAZINON BY FRESHWATER FISH AND SNAIL. Bull. Environ. Contam. Toxicol. 20 (5): 613-617. Nov. 1978. SFA 24(1)
[Natl. Inst. Agric. Sci., 2-1-7, Nishigahara, Kita-ku, Tokyo, 114 Japan]

79-000607 Kapur, K.; Kamaldeep, K.; Toor, H. S. THE EFFECT OF FENITROTHION ON REPRODUCTION OF A TELEOST FISH, /CYPRINUS CARPIO COMMUNIS/ LINN: A BICCHEMICAL STUDY. Bull. Environ. Contam. Toxicol. 20 (4): 438-442. Oct. 1978. SFA 24(1)
[Dep. Zool., Punjab Agric. Univ., Ludhiana, India]

79-000608 Kumagai, H.; Saeki, K. [UTILIZATION OF THE STEAM DISTILLATION PROCEDURE FOR THE DETERMINATION OF METHYL MERCURY IN FISH AND SHELLS BY GAS-LIQUID CHROMATOGRAPHY.] Bull. Jpn. Soc. Sci. Fish. 44 (7): 803-805. July 1978. In Japanese with English summ. SFA 24(1)
[Yamaguchi Pref. Res. Inst. Health, Aoi, Yamaguchi City 753, Japan]

79-000609 Latey, A. N.; Rangneker, P. V. EFFECTS OF METHALLIBURE ON THE EXTERNAL MORPHOLOGY, BEHAVIOUR AND CHROMATIC PHYSIOLOGY OF THE TELEOST, /TILAPIA MOSSAMBICA/ (PETERS). Hydrobiologia 60 (3): 221-227. 8 Sept. 1978. SFA 24(1)
[Dep. Biol. Arts Sci. Commer. Coll., Chalisgaon 424101, Maharashtra, India]

79-000610 Leatherland, J. F.; Sonstegard, R. A. LOWERING OF SERUM THYROXINE AND TRIIODOTHYRONINE LEVELS IN YEARLING COHO SALMON, /ONCORHYNCHUS KISUTCH/, BY DIETARY MIREX AND PCBS. J. Fish. Res. Board Can. 35 (10): 1285-1289. Oct. 1978. In English with French summ. SFA 24(1)
[Dep. Zool., Univ. Guelph, Guelph, ON N1G 2W1, Canada]

79-000611 Lorz, H. W.; Williams, R. H.; Fustish, C. A. EFFECTS OF SEVERAL METALS ON SMOLTING OF COHO SALMON. U.S. Environ. Prot. Agency Res. Rep. Ser. EPA-600/3-78-090. xi + 85p. Sept. 1978. SFA 24(1)
[Res. Dev. Sect., Oreg. Dep. Fish Wildl., Corvallis 97331] Exposure to sublethal levels of copper in freshwater reduces Na,K-activated gill ATP'ase in coho salmon and results in latent effects such as poor migration and poor survival in seawater. Similar tests with cadmium, chromium, mercury, nickle and zinc indicated that only mercury produced similar latent effects. Additional tests with cadmium and zinc plus 10 ug/liter of copper produced latent effects considerably more severe than those produced by 10 ug Cu/liter by itself. Histological examination of liver, kidney and gill showed no effect of cadmium or zinc, either singly or in combination with copper. Cadmium was found to accumulate in gill, liver and kidney, but only minor amounts occurred in muscle tissue. A seawater-Entry test (SET) is recommended for detecting latent effects of toxicants on salmonid smolts.

79-000612 Lubinski, K. S.; Dickson, K. L.; Cairns, J., Jr. CHANGES IN THE LOCOMOTOR BEHAVIOR OF BLUEGILLS, /LEPOMIS MACROCHIRUS/ (RAF.) DURING ACCLIMATION IN AN OBSERVATION CHAMBER. Trans. Ill. State Acad. Sci. 70 (2): 238. 1977. Abstract only. SFA 24(1)
[VPI&SU, Blacksburg, VA 20461] As part of a study to determine the effects of pollutants on the activity, turning behavior and avoidance responses of fish, five locomotor parameters (distance traveled, time spent swimming, time spent turning, mean straight-path length, and time spent in each of four quadrants) were calculated for individual bluegills following their introduction into an open-field laminar flow observation tank. The behavior of each fish was monitored for 3 or 4 days during 10 hr simulated daylight periods. All of the parameters, and particularly those indicating general activity, were highly variable during the first two days of acclimation, indicating that at least this much time may be required before behavioral predictions can be made.

79-000613 McKague, A. B.; Pridmore, R. B. TOXICITY OF ALTOSID AND DIMILIN TO JUVENILE RAINBOW TROUT AND COHO SALMON. Bull. Environ. Contam. Toxicol. 20 (2): 167-169. Aug. 1978. SFA 24(1)
[B.C. Research, 3650 Wesbrook Mall, Vancouver, BC V6S 2L2, Canada]

79-000614 McLeay, D. J.; Gordon, M. R. EFFECT OF SEASONAL PHOTOPERIOD ON ACUTE TOXIC RESPONSES OF JUVENILE RAINBOW TROUT (/SALMO GAIRDNERI/) TO PULPMILL EFFLUENT. J. Fish. Res. Board Can. 35 (10): 1388-1392. Oct. 1978. In English with French Summ. SFA 24(1)
[Div. Appl. Biol., B.C. Research, Vancouver, BC V6S 2L2, Canada]

79-000615 Meyer, F. P.; Schnick, R. A. THE APPROACHING CRISIS IN THE REGISTRATION OF FISHERY CHEMICALS. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 5-14. 1976[1978]. SFA 24(1)
[U.S. FWS, P.O. Box 818, La Crosse, Wi 54601] Review of the status of chemicals used in fisheries indicates that many lack proper registrations. Regulations of the U.S. Environmental Protection Agency and U.S. Food and Drug Administration require that all existing registrations be reviewed and reregistered by October 1977. Adequate data to support reregistration are lacking for some of the most widely used chemicals. Applications of unregistered compounds are strictly prohibited under penalty of law. Cancellation of existing registrations, high costs of research, high manpower requirements, and the long time required to complete adequate research contribute to a situation in which fishery workers may be deprived of needed management tools. All phases of fishery management are directly affected. The loss of therapeutants, anesthetics, herbicides, and pisicides will be reflected in lower hatchery production, fish of poorer quality,--and increased costs. Survival of fish that are in poor health when stocked will be reduced. Loss of the use of chemicals to reclaim or renovate lakes and streams will further reduce the success of stocking programs and increase management costs. Commercial producers may be unable to cope with disease and water quality problems. Researchers will be unable to maintain experimental animals in consistently uniform health or to obtain high quality stock without significant increases in cost. A significant increase in funding and research by Federal, State, and industrial agencies is required if the crisis is to be avoided.

79-000616 Morgan, H. G. SUBLETHAL EFFECTS OF DIAZINON ON STREAM INVERTEBRATES. Ph.D. dissertation, Univ. Guelph 1977. From Diss. Abstr. Int. B Sci. Eng. 38(1):125. July 1977. SFA 24(1)

79-000617 Morgan, R. P. II; Prince, R. D. CHLORINE EFFECTS ON LARVAL DEVELOPMENT OF STRIPED BASS (/MORONE SAXATILIS/), WHITE PERCH (/M. AMERICANA/) AND BLUEBACK HERRING (/ALOSA AESTIVALIS/). Trans. Am. Fish. Soc. 107 (4): 636-641. July 1978. SFA 24(1)
[Battelle Columbus Lab., William F. Clapp Lab., Inc., Duxbury, MA 02332]

79-000618 Niimi, A. J. LAG ADJUSTMENT BETWEEN ESTIMATED AND ACTUAL PHYSIOLOGICAL RESPONSES CONDUCTED IN FLOW-THROUGH SYSTEMS. J. Fish. Res. Board Can. 35 (9): 1265-1269. Sept. 1978. In English with French summ. SFA 24(1)
[Canada Cent. Inland Waters, Great Lakes Biolimnol. Lab., P.O. Box 5050, Burlington, ON L7R 4A6, Canada]

79-000619 Norstrom, R. J.; Hallett, D. J.; Sonstegard, R. A. COHO SALMON (/ONCORHYNCHUS KISUTCH/) AND HERRING GULLS (/LARUS ARGENTATUS/) AS INDICATORS OF ORGANOCHLORINE CONTAMINATION IN LAKE ONTARIO. J. Fish. Res. Board Can. 35 (11): 1401-1409. Nov. 1978. In English with French summ. SFA 24(1)
[Can. Wildl. Serv., Wildl. Toxicol. Div., Ottawa, ON K1A 0E7, Canada]

79-000620 Ruby, S. M.; Aczel, J.; Craig, G. R. THE EFFECTS OF DEPRESSED PH ON SPERMATOGENESIS IN FLAGFISH /JORDANELLA FLORIDAE/. Water Res. 12 (8): 621-626. 1978. SFA 24(1)
[Dep. Biol. Sci., Sir George Williams Campus, Montreal, PQ, Canada]

79-000621 Sastry, K. V.; Gupta, P. K. EFFECT OF MERCURIC CHLORIDE ON THE DIGESTIVE SYSTEM OF A TELEOST FISH, /CHANNA PUNCTATUS/. Bull. Environ. Contam. Toxicol. 20 (3): 353-360. Sept. 1978. SFA 24(1)
[Dep. Zool., D.A.V.(P.G.) Coll., Muzaffarnagar (U.P.), India] The effect of 1.8 mg/liter (LC(50)) of mercuric chloride exposure on the activities of alkaline phosphatase, acid phosphatase, glucose-6-phosphatase, amylase, pepsin, trypsin, tripeptidase glycyl-glycine dipeptidase and carnosinase has been examined in /Channa punctatus/. The three phosphatases have been inhibited in the liver but showed an increase in activity in the intestine and pyloric caeca. Amylase, pepsin and trypsin have also shown a slight increase in activity. There has been no significant alteration in the activities of the peptidases. The results show that mercury inhibits the activities of phosphatases in the liver but has no significant effect on the digestive enzymes within the experimental period of 96 hours.

79-000622 Sastry, K. V.; Sharma, S. K. THE EFFECT OF ENDRIN ON THE HISTOPATHOLOGICAL CHANGES IN THE LIVER OF /CHANNA PUNCTATUS/. Bull. Environ. Contam. Toxicol. 20 (5): 674-677. Nov. 1978. SFA 24(1)
[Dep. Zool., D.A.V. Coll., Muzaffaragar, U.P. India]

79-000623 Sastry, K. V.; Sharma, S. K. THE EFFECT OF /IN VIVO/ EXPOSURE OF ENDRIN ON THE ACTIVITIES OF ACID, ALKALINE AND GLUCOSE-6-PHOSPHATASES IN LIVER AND KIDNEY OF /OPHIOCEPHALUS (CHANNA) PUNCTATUS/. Bull. Environ. Contam. Toxicol. 20 (4): 456-460. Oct. 1978. SFA 24(1)
[Dep. Zool., D.A.V. Coll., Muzaffarnagar, U.P. India]

79-000624 Schnick, R. A.; Meyer, F. P. REGISTRATION OF THIRTY-THREE FISHERY CHEMICALS: STATUS OF RESEARCH AND ESTIMATED COSTS OF REQUIRED CONTRACT STUDIES. U.S. Fish Wildl. Serv. Invest. Fish Control 86. 19p. 1978. SFA 24(1)
[U.S. FWS, Fish Control Lab., P.O. Box 818, La Crosse, WI 54601] An estimated $8.8 million for contract studies is needed to meet registration requirements for 33 chemicals now used or being considered for use in fish culture and management. Information given for each chemical includes its sponsor, current registration status, research situation in six categories (toxicity to target and nontarget organisms, field testing, physiological studies, analytical methods development, counteraction, and mammalian safety determination), costs of required contract studies, and the prognosis for registration of the use of each compound.

79-000625 Servizi, J. A.; Martens, D. W. EFFECTS OF SELECTED HEAVY METALS ON EARLY LIFE OF SOCKEYE AND PINK SALMON. Int. Pac. Salmon Fish. Comm. Prog. Rep. No. 39. 26p. 1978. SFA 24(1)
[Int. Pac. Salmon Fish. Comm., New Westminister, BC, Canada] Mortality, hatching and growth of sockeye salmon during the egg to fry stage were not affected by continuous exposure to 5.7 ug/l cadmium. However, the 168 hr LC50 for first feeding fry was 8 ug/l cadmium. When exposed to copper, the incipient lethal level was between 37 and 78 for sockeye but between 25 and 55 ug/l for pink salmon during the egg to fry stage. Growth and hatching were no better than mortality as indicators of toxic effects of copper. Copper inhibited egg capsule softening, but associated mortalities during hatching occurred only at concentrations also lethal to eggs and alevins. Copper was concentrated by eggs, alevins and fry in proportion to exposure concentrations. Copper concentrations of 105 and 6.8 ppm in pink salmon eyed eggs and fry, respectively, coincided with moralities. Continuous exposure of eggs to 2.5 ug/l mercury caused malformed embryos at hatching. Mortality, growth and hatching were less sensitive to mercury than was malformation. Mecury was concentrated by sockeye and pink salmon in proportion to exposure concentration during the egg to fry stage. Mercury concentrations of 1.87 ppm in eyed eggs coincided with malformed embryos at hatching.--From abstr.

79-000626 Shephard, K.; Simkiss, K. THE EFFECTS OF HEAVY METAL IONS ON $CA^{2}\geq$ ATPASE EXTRACTED FROM FISH GILLS. Comp. Biochem. Physiol. B Comp. Biochem. 61 (1): 69-72. 1978. SFA 24(1)
[Dep. Zool., Univ. Reading, Whiteknights, Reading, England] The gills of the freshwater fish /Rutilus rutilus/ have been shown to contain a subcellular membrane fraction which is rich in the enzyme Ca^{2+} ATPase. The enzyme is maximally activiated by Ca^{2+} or Mg^{2+} ions at a concentration of about 2mM but is not affected by Na^{+} or K^{+} ions or by ouabain. /In vitro/ the enzyme is inhibited by Cu^{2+}, Pb^{2+}, Zn^{2+} and Hg^{2+} ions at concentrations below 10 uM. Copper ions at concentrations below 0.2 uM appear to induce the formation of additional enzyme units when applied to fish gills /in vivo/.

79-000627 Sivarajah, K.; Franklin, C. S.; Williams, W. P. THE EFFECTS OF POLYCHLORINATED BIPHENYLS ON PLASMA STEROID LEVELS AND HEPATIC MICROSOMAL ENZYMES IN FISH. J. Fish Biol. 13 (4): 401-409. Oct. 1978. SFA 24(1)
[Dep. Pharmacol., Chelsea Coll., Univ. London, Manresa Rd., London SW3 6LX, England]

79-000628 Sivarajah, K.; Franklin, C. S.; Williams, W. P. SOME HISTOPATHOLOGICAL EFFECTS OF AROCLOR 1254 ON THE LIVER AND GONADS OF RAINBOW TROUT, /SALMO GAIRDNERI/ AND CARP, /CYPRINUS CARPIO/. J. Fish Biol. 13 (4): 411-414. Oct. 1978. SFA 24(1)
[Dep. Pharmacol., Chelsea Coll., Univ. London, Manresa Rd., London SW3 6LX, England]

79-000629 Slooff, W.; Rab, E.; Spierenburg, T. P. CONTINUOUS STANDARD WATER DELIVERY SYSTEM FOR BIOASSAYS WITH AQUATIC ORGANISMS. Prog. Fish-Cult. 40 (3): 112-114. July 1978. SFA 24(1)
[Natl. Inst. Water Supply, Chem. Biol. Div., Lab. Hydrobiol., Postbox 150, Leidschendam, The Netherlands]

79-000630 Smith, L. L., Jr.; Broderius, S. J.; Oseid, D. M.; Kimball, G. L.; Koenst, W. M. ACUTE TOXICITY OF HYDROGEN CYANIDE TO FRESHWATER FISHES. Arch. Environ. Contam. Toxicol. 7 (3): 325-337. 1978. SFA 24(1)

[Dep. Entomol. Fish. Wildl., Univ. Minn., 1980 Folwell Ave., St. Paul 55108] Acute toxicity of hydrogen cyanide was determined at various temperatures from 4° to 30°C and oxygen concentrations of 3.36 to 9.26 mg/L on different life history stages of five species of fish: fathead minnow, /Pimephales promelas/ Rafinesque; bluegill, /Lepomis macrochirus/ Rafinesque; yellow perch, /Perca flavescens/ (Mitchill); brook trout, /Salvelinus fontinalis/ (Mitchill); and rainbow trout, /Salmo gairdneri/ Richardson. Median lethal threshold concentrations and 96-hr LC50's were established by flow-through type bioassays. Acute toxicity varied from 57 ug/L for juvenile rainbow trout to 191 ug/L for field stocks of juvenile fathead minnows. Juvenile fish were more sensitive at lower temperatures and at oxygen levels below 5 mg/L. For most species juveniles were most sensitive and eggs more resistant.

79-000631 Solomon, H. M. THE TERATOGENIC EFFECTS OF THE INSECTICIDES DDT, CARBARYL, MALATHION AND PARATHION ON DEVELOPING MEDAKA EGGS (/ORYZIAS LATIPES/). Ph.D. dissertation, Rutgers Univ. 179p. 1977. From Diss. Abstr. Int. B Sci. Eng. 39(5):2176. Nov. 1978. SFA 24(1)

79-000632 Strange, J. P.; Fletcher, D. J.; Allred, P. M. CARDIAC AND OPERCULAR RESPONSES IN CHANNEL CATFISH (/ICTALURUS PUNCTATUS/) EXPOSED TO HIGH LEVELS OF PHOSPHATE. J. Environ. Sci. Health A Environ. Sci. Eng. 13 (7): 501-515. 1978. SFA 24(1)

[Franklin Inst. Res. Lab., Natl. Cent. Toxicol. Res., Jefferson, AR 72079]

79-000633 Sugatt, R. H. EFFECTS OF SUBLETHAL HEXAVALENT CHROMIUM EXPOSURE ON THE OSMOREULATION, IMMUNE RESPONSE, AND BLOOD CHARACTERISTICS OF COHO SALMON (/ONCORHYNCHUS KISUTCH/). Ph.D. dissertation, Univ. N.H. 86p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(5):2178. Nov. 1978. SFA 24(1)

79-000634 Swarts, F. A.; Dunson, W. A.; Wright, J. E. GENETIC AND ENVIRONMENTAL FACTORS INVOLVED IN INCREASED RESISTANCE OF BROOK TROUT TO SULFURIC ACID SOLUTIONS AND MINE ACID POLLUTED WATERS. Trans. Am. Fish. Soc. 107 (5): 651-677. Sept. 1978. SFA 24(1)

[Pa. State Univ., University Park 16802]

79-000635 Taylor, J. L. TOXICITY OF COPPER AND ZINC IN TWO ARKANSAS STREAMS TO MOSQUITOFISH (/GAMBUSIA AFFINIS/). Bios 49 (3): 99-106. Oct. 1978. SFA 24(1)

[Dep. Biol. Sci., Ark. State Univ. Jonesboro 72467] Toxicity of copper and zinc to /Gambusia affinis/ was established. Besides affecting fish survival, copper and zinc were found to have some influence on metabolic oxygen consumption. The data indicate that almost all water samples collected in Turtle Creek and Eight-Mile Creek contained copper and zinc levels above the median tolerance levels determined for /G. affinis/, and that these values were also greater than the legally accepted quantity of those toxicants in Arkansas streams. It was indicated that Turtle Creek has copper and zinc concentrations greater below Jonesboro than it has above that city.

79-000636 Trivedi, R. C.; Dubey, P. S. EVALUATION OF TOXICITY OF SOME INDUSTRIAL WASTES TO FISH BY BIOASSAY. Environ. Pollut. 17 (1): 75-80. Sept. 1978. SFA 24(1)
[Sch. Stud. Bot., Vikram Univ., Ujjain (MP), India] Toxicities of effluents from caustic and rayon industries to fish (/Barbus stigma/) were determined by bioassay. Wastes diluted forty times were still found to be lethal. Zinc, mercury, sulphuric acid and organic matter were the main pollutants. The receiving river was found to be unfit for fish growth up to 35 km downstream. Some treatments for such wastes are suggested, and the TLm values discussed.

79-000637 Verma, S. R.; Bansal, S. K.; Dalela, R. C. TOXICITY OF SELECTED ORGANIC PESTICIDES TO A FRESH WATER TELEOST FISH, /SACCOBRANCHUS FOSSILIS/ AND ITS APPLICATION IN CONTROLLING WATER POLLUTION. Arch. Environ. Contam. Toxicol. 7 (3): 317-323. 1978. SFA 24(1)
[Zool. Dep., DAV Coll. Muzaffarnagar (251001) India]

79-000638 Volund, A. APPLICATION OF THE FOUR-PARAMETER LOGISTIC MODEL TO BIOASSAY: COMPARISON WITH SLOPE RATIO AND PARALLEL LINE MODELS. Biometrics 34 (3): 357-365. Sept. 1978. SFA 24(1)
[Novo Res. Inst., Novo Alle, 2880 Bagsvaerd, Denmark]

79-000639 Waiwood, K. G.; Beamish, F. W. H. EFFECTS OF COPPER, PH AND HARDNESS ON THE CRITICAL SWIMMING PERFORMANCE OF RAINBOW TROUT (/SALMO GAIRDNERI/ RICHARDSON). Water Res. 12 (8): 611-619. 1978. SFA 24(1)
[Fish. Mar. Serv., Biol. Stn., St. Andrews, NB E0G 2X0, Canada]

79-000640 Zaba, B. N.; Harris, E. J. ACCUMULATION AND EFFECTS OF TRACE METAL IONS IN FISH LIVER MITOCHONDRIA. Comp. Biochem. Physiol. C Comp. Pharmacol. 61 (1): 89-93. 1978. SFA 24(1)
[Dep. Biochem. Soil Sci., Univ. Coll. North Wales, Bangor, Gwynedd, LL57 2UW, North Wales]

FISH TOXICANTS

79-000641 Dawson, V. K.; Harman, P. D.; Schultz, D. P.; Allen, J. L. RAPID METHOD FOR DETERMINING CONCENTRATIONS OF BAYER 73 IN WATER DURING LAMPRICIDE TREATMENTS. J. Fish. Res. Board Can. 35 (9): 1262-1265. Sept. 1978. In English with French summ. SFA 24(1)
[U.S. FWS, Fish Control Lab., La Crosse, WI 54601]

79-000642 Prentice, J. A.; Durocher, P. P.; Pritchard, D. L. EVALUATION OF ANHYDROUS AMMONIA FOR FISHERY MANAGEMENT USES. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 88-98. 1976[1978]. SFA 24(1)
[Tex. Parks Wildl. Dep., Ingram 78025] Anhydrous ammonia was applied to ponds at average rates of 18-40 ppm to evaluate its use as a fish toxicant and aquatic herbicide. Ponds contained toxic levels of ammonia for 3-4 weeks after applications, depending on concentration, water temperature and other factors. A regression model was developed to estimate specific dissipation times. Application of 15 ppm ammonia

79-000642 CONTINUED
effected a high percent mortality to all fish species observed. Complete fish kills occurred at approximately 30 ppm ammonia. Any concentration above 15 ppm temporarily controlled most vegetation, regardless of season. Benthic organisms were reduced but not eliminated by any treatment. Anhydrous ammonia was found to be relatively inexpensive compared to other fish toxicants and aquatic herbicides.

RESEARCH AND MANAGEMENT-GENERAL

79-000643 Berdichevskiy, L. S.; Ioganzen, B. G. SIXTY YEARS OF SOVIET ICHTHYOLOGY (1917-1977). J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (6): 821-834. 1977. SFA 24(1)
[Ichthyol. Comm. USSR Minist. Fish., Moscow, USSR]

79-000644 Crawford, J. E.; Lewis, D. E. U.S. BUREAU OF LAND MANAGEMENT VIEWS: WILDLIFE AND WILDERNESS MANAGEMENT ON THE PUBLIC LANDS. Trans. N. Am. Wildl. Nat. Resour. Conf. 43: 362-367. 1978. SFA 24(1)
[U.S. Bur. Land Manage., Washington, DC]

79-000645 de Groot, S. J. PIETER KORRINGA AND HIS CONTRIBUTIONS TO SCIENCE AND FISHERY MANAGEMENT IN THE PERIOD 1937-1978. Neth. J. Zool. 28 (1): 1-12. Mar. 1978. SFA 24(1)

79-000646 Evans, B. SIERRA CLUB'S VIEWS: FISH AND WILDLIFE MANAGEMENT AND WILDERNESS. Trans. N. Am. Wildl. Nat. Resour. Conf. 43: 386-390. 1978. SFA 24(1)
[Sierra Club, Washington, DC]

79-000647 Griswold, R. K. IAFWA WILDERNESS POLICY: FOREST SERVICE VIEWS. Trans. N. Am. Wildl. Nat. Resour. Conf. 43: 368-371. 1978. SFA 24(1)
[U.S. For. Serv., Washington, DC]

79-000648 Hatcher, R. M. CRITICAL ENERGY CHOICES: POTENTIAL FISH AND WILDLIFE IMPACTS. Trans. N. Am. Wildl. Nat. Resour. Conf. 43: 253-265. 1978. SFA 24(1)
[Tenn. Wildl. Resour. Agency, Nashville]

79-000649 Herdendorf, C. E. ENVIRONMENTAL IMPACT ASSESSMENT: AN AQUATIC BIOLOGIST'S POINT OF VIEW. Ohio J. Sci. 78 (4): 229-234. July 1978. SFA 24(1)
[cent. Lake Erie Area Res., Ohio State Univ., Columbus 43210]

79-000650 Hoover, R. L. IAFWA WILDERNESS POLICY: STATE WILDLIFE AGENCY VIEWS. Trans. N. Am. Wildl. Nat. Resour. Conf. 43: 372-380. 1978. SFA 24(1)
[Colo. Div. Wildl., Denver]

79-000651 Huey, W. S. HIGHLIGHTS OF THE POLICY: FISH AND WILDLIFE MANAGEMENT FOR PRIMITIVE AREAS. Trans. N. Am. Wildl. Nat. Resour. Conf. 43: 358-361. 1978. SFA 24(1)
[N. Mex. Dep. Game Fish, Santa Fe]

79-000652 Merritt, C. R. IAFWA WILDERNESS POLICY: THE WILDERNESS SOCIETY'S VIEWS. Trans. N. Am. Wildl. Nat. Resour. Conf. 43: 381-385. 1978. SFA 24(1)
[The Wilderness Society, Denver, CO]

79-000653 Peine, J. D. THE 1977 NATIONAL OUTDOOR RECREATION SURVEYS. Trans. N. Am. Wildl. Nat. Resour. Conf. 43: 108-116. 1978. SFA 24(1)
[Heritage Conserv. Recreation Serv., Ann Arbor, MI]

79-000654 Pelzman, R. J. HOOKING MORTALITY OF JUVENILE LARGEMOUTH BASS, /MICROPTERUS SALMOIDES/. Calif. Fish Game 64 (3): 185-188. July 1978. SFA 24(1)
[Calif. Dep. Fish Game, Sacramento 95819] Mortalities of juvenile largemouth bass due to hooking were studied as part of an overall assessment of the value of minimum length limit regulations. Significant mortality occurred only among fish hooked in the esophageal area. Results indicate that direct mortality due to hooking is not a factor which materially reduces the value of size limit regulations.

79-000655 Shay, R. ARE FISHERY BIOLOGISTS REALLY PROFESSIONALS? Fisheries (Bull. Am. Fish. Soc.) 3 (5): 270. Sept.-Oct. 1978. SFA 24(1)
[Oreg. Dep. Fish. Wildl., Portland]

79-000656 Stansby, M. E. CHARLES WOODS, PIONEER SCIENTIST ON CHEMICAL COMPOSITION OF FISH. Mar. Fish Rev. 40 (7): 1-4. July 1978. SFA 24(1)
[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112]

79-000657 States, J. B.; Haug, P. T.; Shoemaker, T. G.; Reed, L. W.; Reed, E. B. A SYSTEMS APPROACH TO ECOLOGICAL BASELINE STUDIES. U.S. Fish Wildl. Serv. FWS/OBS-78/21. 392p. Mar. 1978. SFA 24(1)
[Ecology Consultants, Inc., P.O. Box 2105, Fort Collins, CO 80522] This handbook describes a systematic approach to planning and conducting a "holistic" study of selected ecosystem components and functions, which are significant with regard to energy development projects in the Western United States. Techniques of ecological systems analysis are described, and the manual explains how to build a conceptual ecosystem model and use it to plan a baseline study. A glossary of key terms and an annotated bibliography are included.

79-000658 Townsend, J. E.; Smith, R. J. , (eds.) IMPROVING FISH AND WILDLIFE BENEFITS IN RANGE MANAGEMENT. U.S. Fish. Wildl. Serv. FWS/OBS-77/01. vi + 118p. Mar. 1977. SFA 24(1)
[U.S. FWS, Off. Biol. Serv., Washington, DC 20240] A collection of papers presented at a seminar in Washington, DC in March, 1976.--RS

79-000659 Warner, K. HOCKING MORTALITY OF LAKE-DWELLING LANDLOCKED ATLANTIC SALMON, /SALMO SALAR/. Trans. Am. Fish. Soc. 107 (4): 518-522. July 1978. SFA 24(1)
[Me. Dep. Inland Fish. Wildl., Bangor 04401]

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79-000660 Hoffman, A. A. FISH DIVISION BUDGETARY PROBLEMS IN THE SOUTHEASTERN STATES. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 1-4. 1976[1978]. SFA 24(1)
[Va. Comm. Game Inland Fish., Danville]

REPORTS OF FISHERY STATIONS, STATES, ETC.

79-000661 Cope, O. B. , (ed.) COLORADO FISHERIES RESEARCH REVIEW, 1976-1977. Colo. Div. Wildl. Fish. Res. Sect. Rev. No. 9. vii + 64p. Sept. 1978. Available at $1.50 from Research Center Librarian, Div. Wildl., P.O. Box 2287, Fort Collins, CO 80522. SFA 24(1)

79-000662 North American Salmon Research Center ANNUAL REPORT TO THE ADVISORY COUNCIL OF THE NORTH AMERICAN SALMON RESEARCH CENTER. N. Am. Salmon Res. Cent. Rep. No. 4-1978. 8p. 1978. SFA 24(1)
[Box 488, St. Andrews, NB E0G 2X0, Canada]

79-000663 North American Salmon Research Center ANNUAL REPORT TO THE ADVISORY COUNCIL OF THE NORTH AMERICAN SALMON RESEARCH CENTER. N. Am. Salmon Res. Cent. Rep. No. 3-1978. 7p. 1978. SFA 24(1)
[Box 488, St. Andrews, NB E0G 2X0, Canada]

79-000664 Scott, T. G.; Schultz, H. C.; Eschmeyer, P. H. , (eds.) FISHERIES AND WILDLIFE RESEARCH 1977. U.S. Fish Wildl. Serv. iv + 151p. 1978. Available from Supt. Doc., U.S. GPO, Washington, D.C. 20402. SFA 24(1)

HABITAT ALTERATION

79-000665 Binns, N. A. CHANNELIZATION AND TROUT. Wyo. Wildl. 42 (11): 18-21. Nov. 1978. SFA 24(1)
[Wyo. Game Fish Dep., Lander]

79-000666 Binns, N. A. STREAM CHANNEL MODIFICATION. Wyo. Wildl. 42 (11): 14-17. Nov. 1978. SFA 24(1)
[Wyo. Game Fish Dep., Lander]

79-000667 Cloud, T. J., Jr. TEXAS LIGNITE: ENVIRONMENTAL PLANNING OPPORTUNITIES. U.S. Fish Wildl. Serv. FWS/OES-78/26. iv + 14p. June 1978. SFA 24(1)
[U.S. FWS, 819 Taylor St., 9A33 Fed. Bldg., Fort Worth, TX 76102]

79-000668 Duyvejonck, J. DISTRIBUTION AND MOVEMENTS OF FISHES IN A SMALL STREAM. 70 (2): 212. 1977. Abstract only. SFA 24(1)
[Ill. State Univ., Normal 61761] The effects of dredging upon a small stream are studied with regard to species composition. The species composition in an undredged section is compared to a dredged section. Samples were taken every two weeks from August through mid-November. Fish movements in the Study area were also studied by a mark-recapture method using freeze branding. Recaptures were made two weeks after marking. The distance from the original release site was recorded for each species. Evidence suggests that dredging disrupts habitat favored by some species and that they do not readily return to such areas. recapture of marked fishes indicates that they exhibit little fall movement, but there appears to be a slight downstream movement.

79-000669 Eiserman, F. CHANNELIZATION--A STRAIGHT AND NARROW PATH TO STREAM DEGRADATION. Wyo. Wildl. 42 (11): 10-13. Nov. 1978. SFA 24(1)
[Wyo. Game Fish Dep., Casper]

79-000670 Eiserman, F. M. STREAM HABITAT LOSSES. PART 2. Wyo. Wildl. 42 (11): 30-31. Nov. 1978. SFA 24(1)
[Wyo. Game Fish Dep., Casper]

79-000671 Eiserman, F. M. STREAM HABITAT LOSSES. PART 3. Wyo. Wildl. 42 (11): 32-33. Nov. 1978. SFA 24(1)
[Wyo. Game Fish Dep., Casper]

79-000672 Eiserman, F. M. STREAM HABITAT LOSSES. PART 1. Wyo. Wildl. 42 (11): 28-29. Nov. 1978. SFA 24(1)
[Wyo. Game Fish Dep., Casper]

79-000673 Eiserman, F. M. STREAM PRESERVATION. Wyo. Wildl. 42 (11): 22-25. Nov. 1978. SFA 24(1)
[Wyo. Game Fish Dep., Casper]

79-000674 England, R. H.; Fatora, J. R. EFFECT OF LOW HEAD IMPOUNDMENTS ON AMBIENT TROUT STREAM TEMPERATURES. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 285-294. 1976[1978]. SFA 24(1)
[Ga. Dep. Nat. Resour., Gainesville] Data from five northeast Georgia trout streams revealed significant alteration of ambient temperatures by impoundments. A 7.3 ha impoundment releasing water at 3.9 m warmed Anderson Creek a mean 2.2 C during August 1973 and reduced diurnal temperature variation by two-thirds. Surface-release impoundments on Bean Creek and Chickamauga Creek warmed ambient

79-000674 CONTINUED
temperatures a mean 4.2 C and 3.8 C, respectively, during the summer of 1974. Diurnal fluctuations were increased in these two streams. A 21 ha surface release impoundment on Smith Creek warmed ambient stream temperatures a mean 3.6 C during the summer of 1973 in spite of efforts to release water through the drain valve at 18 m below the surface. A multi-level release structure on Taylor Creek designed to closely duplicate ambient mean daily temperatures was not properly adjusted and elevated temperatures a mean 4.3 C during a three month period.

79-000675 Garton, J. E.; Strecker, R. G.; Summerfelt, R. C. PERFORMANCE OF AN AXIAL FLOW PUMP FOR LAKE DESTRATIFICATION. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 336-347. 1976[1978]. SFA 24(1)
[Dep. Agric. Eng., Okla. State Univ., Stillwater 74074] A propeller pump was operated for 120 days on a lake of 40 ha surface area in north-central Oklahoma in the summer of 1975 to accomplish artifical destratification. The pump created a downflow of well-oxygenated surface water by means of a 1.82 m diameter propeller located 1.8 m below the lake's surface. The pump produced a flow of 1.72 m^3/sec, equivalent to 12.9 percent of total lake volume per day, at 17 rpm with a 1.0 h.p. electric motor. Four days of pumping eliminated thermal stratification, it raised the temperature of the hypolimnetic water 9.5 C, but increased surface temperature less than 1°C. Thereafter the entire water column remained isothermal (27-29°C) during the summer. Dissolved oxygen at 5 m increased from 0.2 to 4.3 mg/l after the first day of pumping; thereafter DO levels at 5 and 9 m depths were above levels observed in 1973 and 1974; in mid-July 100 percent of the lake's volume contained more than 5 mg/l DO. BOD levels averaged 2.3 mg/l before pumping but 1.2 mg/l after pumping began. Turbidity did not change substantially with pumping but vertically the variation at 1, 5 and 9 m depths was reduced.

79-000676 Headrick, M. R. EFFECTS OF STREAM CHANNELIZATION ON FISH POPULATIONS IN THE BUENA VISTA MARSH, PORTAGE COUNTY, WISCONSIN. U.S. Fish Wildl. Serv. FWS/OBS-76/24. vii + 38p. Sept. 1976. SFA 24(1)
[Wis. Coop. Fish. Res. Unit, Univ. Wis., Stevens Point] Fish populations from ditches 6-8 years old and 52-62 years old within the Portage County Drainage District were compared with populations in adjacent portions of natural streams. Two study areas were selected: an upstream zone of good brook trout (/Salvelinus fontinalis/) habitat and a downstream zone in marginal trout waters where white sucker (/Catostomus commersoni/) were numerous. Each area included new ditch, old ditch and natural stream, all of similar discharge. Estimates of annual production of brook trout, population and biomass of brook trout and white sucker, and total catch records for other fish species were derived from electrofishing samples in June, August and September, 1974 and April-May, July and September, 1975. A creel survey was conducted during the 1975 trout season. Loss of year-round instream cover through channelization limited brook trout density, which reduced annual production of brook trout to 28.8 kg/stream km in the upstream new ditch study area compared to 72.2 kg/km in the upstream old ditch and 65.5 kg/km in the upstream natural stream. Angler success was also reduced, from 1.03 trout/hr in the upstream old ditch and 1.05 trout/hr in the upstream natural stream to 0.26 trout/hr in the upstream new ditch. Midsummer water temperatures reached upper lethal levels for brook trout in the downstream ditches, where current velocity was reduced and white sucker were abundant. Mottled sculpin (/Cottus bairdi/) were consistently absent from the upstream new ditch and scarce in the downstream new ditch. The natural stream had the greatest number of fish species in both study areas (12

79-000676 CONTINUED
upstream and 18 downstream), and the new ditch had the fewest (9 upstream and 11 downstream).

79-000677 Kallemeyn, L. W.; Novotny, J. F. FISH AND FISH FOOD ORGANISMS IN VARIOUS HABITATS OF THE MISSOURI RIVER IN SOUTH DAKOTA, NEBRASKA, AND IOWA. U.S. Fish Wildl. Serv. FWS/OBS-77/25. ix + 100p. Aug. 1977. SFA 24(1)
U.S. FWS, North Cent. Reservoir Invest., Yankton, SD 57078] Forty-six fish species were collected in the free-flowing river with emerald shiner, river carpsucker, channel catfish, gizzard shad, red shiner, shorthead redhorse, yellow perch, carp and goldeye most abundant. The fish community was less diverse in the channelized river with carp, channel catfish and river carpsucker accounting for 70 percent of the catch. In free-flowing sections, fish used all habitats, but were most abundant in backwaters and marshes. Backwaters were important for spawning and nursery functions. Some species exhibited single habitat preferences, but most utilized several habitats for various life stages. In channelized sections, the largest catches were made in habitats created by notching dikes and revetments. Zooplankton abundance was related directly to reservoir discharges. Macroinvertebrates, detritus and organic matter increased progressively downstream. Drift and particulate organic matter were most abundant in heavy currents of the channel. The report relates habitat characteristics to fish species, sizes and abundances, and to kinds and abundances of fish food.--From summ.

79-000678 Kuntz, B. MALADY AT POLE CREEK. Wyo. Wildl. 42 (11): 34-37. Nov. 1978. SFA 24(1)
[Wyo. Game Fish Dep., Cheyenne]

79-000679 Longley, W. L.; Jackson, R.; Snyder, B. MANAGING OIL AND GAS ACTIVITIES IN COASTAL ENVIRONMENTS. U.S. Fish Wildl. Serv. FWS/OBS-78/54. v + 66p. June 1978. SFA 24(1)
[RPC, Inc., 1705 Guadalupe, Austin, TX 78701]

79-000680 Marshall, H. L. EFFECTS OF MOSQUITO CONTROL DITCHING ON /JUNCUS/ MARSHES AND UTILIZATION OF MOSQUITO CONTROL DITCHES BY ESTUARINE FISHES AND INVERTEBRATES. Ph.D. dissertation, Univ. N.C. (Chapel Hill) 217p. 1976. From Diss. Abstr. Int. B Sci. Eng. 38(2): 489. Aug. 1977. SFA 24(1)
A comparitive study of ditched and unditched marshes at three locations in Carteret County, North Carolina was carried out in 1971-72 to determine the extent of ecological changes caused by ditching. Ditching increased the area of available aquatic habitat in the marshes by a factor of about five, but spoil piles now occupy 10-13 percent of the ditched marsh. The ditches were inhabited by numbers of juvenile fishes, crabs, and shrimps, especially during late winter, spring, and early summer. The ditches increase the amount of nursery area available for fishes and invertebrates including some of commercial and sports interest. Average densities of animals caught by 6.1-m long (3.0 x 4.5 mm mesh opening) seines in blocked off areas was 3.7/m^2 and 6.1/m^2 in ditches and creeks, respectively. The Shannon-Weaver index for fishes and invertebrates in the ditches ranged from 0.8 in March 1971 to 2.3 in June 1971. Fish growth in ditches equalled that reported in the literature for creeks in other estuaries.

79-000681 Maughan, O. E.; Nelson, K. L.; Ney, J. J. EVALUATION OF STREAM IMPROVEMENT PRACTICES IN SOUTHEASTERN TROUT STREAMS. Va. Water Resour. Res. Cent. Bull. 115. vi + 67p. Sept. 1978. Available at $4.00 from Va. Water Resour. Res. Cent., VPI&SU, Blacksburg, VA 24060. SFA 24(1)
[Okla. Coop. Fish Res. Unit, Okla. State Univ., Stillwater] This research evaluated the effects of stream rehabilitation devices on four southeastern Virginia trout streams. The structures examined included log dams in two streams, gabion deflectors in one, and random boulder emplacements in one. This study indicated that in some cases, large pools were impounded above the dams, and, as a result of scouring, noticeable pool formation occurred below all dams. Runs and pools were associated with 11 of 18 gabions, while the use of boulders to increase cover met with variable success: five of the 12 placements resulted in undercutting and 30-cm to 60-cm depth increases, two other placements resulted in slight undercutting, and five had no effect. Fish biomass, trout biomass, and invertebrate numbers did not differ significantly between improved and reference sections. However, in log dam sections during summer low-flow conditions, trout and other fish densities generally were higher in improved areas than in reference areas. The utility of various stream improvement devices is dependent on their proper placement and on a correct assessment of their various limiting factors. Since each stream has a unique combination of biological, physical, and chemical parameters, stream improvement should be performed on a site-specific basis. This study should provide needed data for proper selection, design, and installation of stream-improvement structures.

79-000682 Nelson, W.; Horak, G.; Lewis, M. INSTREAM FLOW STRATEGIES FOR UTAH. U.S. Fish Wildl. Serv. FWS/OBS-78/45. vii + 88p. May 1978. SFA 24(1)
[Enviro Control, Inc., 1520 E. Mulberry St., Fort Collins, CO 80524]

79-000683 Nelson, W.; Horak, G.; Solomon, J. INSTREAM FLOW STRATEGIES FOR IDAHO. U.S. Fish Wildl. Serv. FWS/OBS-78/38. vii + 96p. May 1978. SFA 24(1)
[Enviro Control, Inc., 1520 E. Mulberry St., Fort Collins, CO 80524]

79-000684 Nelson, W.; Horak, G.; Wilsey, S.; Solomon, J. INSTREAM FLOW STRATEGIES FOR WASHINGTON. U.S. Fish Wildl. Serv. FWS/OBS-78/46. vii + 107p. May 1978. SFA 24(1)
[Enviro Control, Inc., 1520 E. Mulberry St., Fort Collins, CO 80524]

79-000685 Nelson, W.; Horak, G.; Solomon, J. INSTREAM FLOW STRATEGIES FOR MONTANA. U.S. Fish Wildl. Serv. FWS/OBS-78/39. vii + 102p. May 1978. SFA 24(1)
[Enviro Control, Inc., 1520 E. Mulberry St., Fort Collins, CO 80524]

79-000686 Nelson, W.; Horak, G.; Solomon, J. INSTREAM FLOW STRATEGIES FOR ARIZONA. U.S. Fish Wildl. Serv. FWS/OBS-78/35. vii + 90p. May 1978. SFA 24(1)
[Enviro Control, Inc., 1520 E. Mulberry St., Fort Collins, CO 80524]

79-000687 Nelson, W.; Horak, G.; Solomon, J. INSTREAM FLOW STRATEGIES FOR NORTH DAKOTA. U.S. Fish Wildl. Serv. FWS/OBS-78/42. vii + 96p. May 1978. SFA 24(1)
[Enviro Control, Inc., 1520 E. Mulberry St., Fort Collins, CO 80524]

79-000688 Nelson, W.; Horak, G.; Solomon, J. INSTREAM FLOW STRATEGIES FOR SOUTH DAKOTA. U.S. Fish Wildl. Serv. FWS/OBS-78/44. vii + 96p. May 1978. SFA 24(1)
[Enviro Control, Inc., 1520 E. Mulberry St., Fort Collins, CO 80524]

79-000689 Nelson, W.; Horak, G.; Lewis, M. INSTREAM FLOW STRATEGIES FOR COLORADO. U.S. Fish Wildl. Serv. FWS/OBS-78/37. vii + 90p. May 1978. SFA 24(1)
[Enviro Control, Inc., 1520 E. Mulberry St., Fort Collins, CO 80524]

79-000690 Nelson, W.; Horak, G.; Solomon, J. INSTREAM FLOW STRATEGIES FOR WYOMING. U.S. Fish Wild. Serv. FWS/OBS-78/47. vii + 88p. May 1978. SFA 24(1)
[Enviro Control, Inc., 1520 E. Mulberry St., Fort Collins, CO 80524]

79-000691 Nelson, W.; Horak, G.; Solomon, J. INSTREAM FLOW STRATEGIES FOR NEVADA. U.S. Fish Wildl. Serv. FWS/OBS-78/40. vii + 89p. May 1978. SFA 24(1)
[Enviro Control, Inc., 1520 E. Mulberry St., Fort Collins, CO 80524]

79-000692 Nelson, W.; Horak, G.; Lewis, M. INSTREAM FLOW STRATEGIES FOR CALIFORNIA. U.S. Fish Wildl. Serv. FWS/OBS-78/36. vii + 96p. May 1978. SFA 24(1)
[Enviro Control, Inc., 1520 E. Mulberry St., Fort Collins, CO 80524]

79-000693 Nelson, W.; Horak, G.; Solomon, J. INSTREAM FLOW STRATEGIES FOR NEW MEXICO. U.S. Fish Wildl. Serv. FWS/OBS-78/41. vii + 85p. May 1978. SFA 24(1)
[Enviro Control, Inc., 1520 E. Mulberry St., Fort Collins, CO 80524]

79-000694 Nelson, W.; Horak, G.; Wilsey, S. INSTREAM FLOW STRATEGIES FOR OREGON. U.S. Fish Wildl. Serv. FWS/OBS-78/43. vii + 113p. May 1978. SFA 24(1)
[Enviro Control, Inc., 1520 E. Mulberry St., Fort Collins, CO 80524]

79-000695 Norton, S. E.; Timbol, A. S.; Parrish, J. D. STREAM CHANNEL MODIFICATION IN HAWAII. PART B: EFFECT OF CHANNELIZATION ON THE DISTRIBUTION AND ABUNDANCE OF FAUNA IN SELECTED STREAMS. U.S. Fish Wildl. Serv. FWS/OBS-78/17. ix + 47p. May 1978. SFA 24(1)
[Hawaii Coop. Fish. Res. Unit, 2538 The Mall, Univ. Hawaii, Honolulu 96822] Effects of channelization on native Hawaiian stream fauna were assessed by making physiochemical measurements and analyzing and comparing macrofaunal communities in channelized and unchannelized streams. The altered study streams had higher mean water temperature, pH, and conductivity and wider ranges of these variables than the unaltered stream. Channel sections with concrete bottom had higher values than sections with natural bottom. Exotic fishes predominated in altered streams; exotic fishes and native crustaceans predominated in unaltered streams. Native fishes appeared to be especially reduced in heavily channelized streams. Channels with artificial bottom seemed to provide nurseries for the exotic poeciliids, /Poecilia mexicana/ and /P. reticulata/; species diversity was lower in these channels. Extreme channelization seems to stress the diadromous native fauna. Channel alterations, particularly artificially lined channels, appear to favor worthless exotics in replacing native species. Channelization in Hawaii should be minimized to protect native fauna. Where it is unavoidable, natural bottom channels seem least damaging. Artificial bottom channels, if used, should provide for reasonable water depth at low flow, and the length of continuous sections should be minimized. Riparian bank vegetation should be maintained. Results of this study are relevant to many tropical oceanic high islands.

79-000696 Platts, W. S. LIVESTOCK INTERACTIONS WITH FISH AND AQUATIC ENVIRONMENTS: PROBLEMS IN EVALUATION. Trans. N. Am. Wildl. Nat. Resour. Conf. 43: 498-504. 1978. SFA 24(1)
[U.S. For. Serv., Boise, ID]

79-000697 Prince, E. D.; Strange, R. J.; Simmons, G. M., Jr. PRELIMINARY OBSERVATIONS ON THE PRODUCTIVITY OF PERIPHYTON ATTACHED TO A FRESHWATER ARTIFICIAL TIRE REEF. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 207-215. 1976[1978]. SFA 24(1)
[U.S. FWS, Southeast Reservoir Invest., 206 Hwy. 123 By-Pass, Clemson, SC 29631] Primary productivity and nutrient concentrations were compared between the periphyton community on a freshwater artificial tire reef and the littoral phytoplankton in Smith Mountain Lake, Virginia, during the months of July, August, and September 1974. Primary productivity and nutrient concentration of the periphyton community were several times greater than that of littoral phytoplankton. The periphyton community was dominated by pennate diatoms and filamentous green algae. Productivity measurements of the reef periphyton were on the same order of magnitude as the highest periphyton production rates reported in the literature. High productivity of the tire reef periphyton supports the hypothesis that freshwater artificial reefs support increased densities of fish and invertebrates by enhancing the productivity of aquatic environments.

79-000698 Tan, K.-H.; Thirumurthi, D. HIGHWAY CONSTRUCTION IMPACT ON WATER-SUPPLY LAKES. Proc. Am. Soc. Civ. Eng. J. Environ. Eng. Div. 104 (5): 997-1011. Oct. 1978. SFA 24(1)
[Interprovincial Eng., Ltd., Halifax, NS, Canada]

79-000699 Teleki, G. C.; Chamberlain, A. J. ACUTE EFFECTS OF UNDERWATER CONSTRUCTION BLASTING ON FISHES IN LONG POINT BAY, LAKE ERIE. J. Fish. Res. Board Can. 35 (9): 1191-1198. Sept. 1978. In English with French summ. SFA 24(1)
[118 Bernard Nelson Crescent, Revelstoke, BC V0E 2S0, Canada]

79-000700 Timbol, A. S.; Maciolek, J. A. STREAM CHANNEL MODIFICATION IN HAWAII. PART A: STATEWIDE INVENTORY OF STREAMS, HABITAT FACTORS AND ASSOCIATED BIOTA. U.S. Fish Wildl. Serv. FWS/OBS-78/16. xiii + 157p. Apr. 1978. SFA 24(1)
[Hawaii Coop. Fish. Res. Unit, 2538 The Mall, Univ. Hawaii, Honolulu 96822] There are at least 366 perennial streams in the five largest islands of Hawaii. Fifteen percent of these streams have been altered. Six types of channel alteration have been identified: lined channel, channel realignment and riparian clearance, elevated culvert, revetment, filled-in channel, and extended culvert. A total length of 151 km of these modifications has been identified. The comparative "abundances" of these are: lined channel, 40 percent; realigned/cleared, 28 percent; revetment, 24 percent; filled-in channel, 5 percent; elevated culvert, 3 percent; and extended culvert, less than 1 percent. Eighty-nine percent of the total length of lined channel is located on Oahu. On the basis of other human distrubances, only 14 percent of Hawaiian streams may be physically pristine, and none of these physically pristine streams is on Oahu, the most populous island in the State. There are apparently no longer any biologically pristine streams, since at least one exotic species was found in all streams sampled. Only 27 percent are of high ecological quality (pristine-preservation use), and none of these high ecological quality streams is on Oahu. Water is exported from 53 percent of all perennial Hawaiian streams. Twenty-five species of fish and decapod crustaceans were collected statewide. Only eight of the species are native to the State. Both in numbers and biomass, native species are dominant in most unaltered streams, while exotic species are dominant in altered streams.

79-000701 Wiley, R.; Dufek, D. STREAM ALTERATION AND TROUT PRODUCTION. Wyo. Wildl. 42 (11): 26-27. Nov. 1978. SFA 24(1)
[Wyo. Game Fish Dep., Laramie]

79-000702 Zimmer, D. W.; Bachman, R. W. A STUDY OF THE EFFECTS OF STREAM CHANNELIZATION AND BANK STABILIZATION ON WARMWATER SPORT FISH IN IOWA. U.S. Fish Wildl. Serv. FWS/OBS-76/14. iii + 87p. May 1976. SFA 24(1)
[Iowa Coop. Fish. Res. Unit, Iowa State Univ., Ames 50011] Relationships between channel morphometry, habitat diversity, and invertebrate drift density were studied in 11 natural and channelized stream segments of the upper Des Moines River Basin during 1974 and 1975. Gradients of the study sites ranged from 0.17 to 2.18 m/km; sinuosity index values were between 0.95 and 1.67. The most obvious effect of channelization on stream habitat was a reduction in the diversity of water depth and current velocity. There was a significant (P=.05) positive correlation between channel sinuosity and the variability of stream depth and velocity. Invertebrate drift density, expressed as biomass and total counts, was also correlated with

79-000702 CONTINUED
channel sinuosity. Sinuous streams had greater concentrations of drifting organisms than did straight channels. There was no relationship between drift density and channel gradient. The impact of channelization on habitat diversity and invertebrate drift density might be minimized if channels were designed with greater sinuousity index values.

HARVEST, CREEL CENSUS

79-000703 Beinssen, K. H. H. RECREATIONAL AND COMMERCIAL ESTUARINE FISHING IN VICTORIA: A PRELIMINARY STUDY. Victoria Fish. Wildl. Pap. No. 16. 40p. Sept. 1978. SFA 24(1)
[Fish. Wildl. Div., Arthur Rylah Inst. Environ. Res., Brown St., Heidelberg, Victoria, Australia 3084]

79-000704 Campbell, W. J.; Hayes, E.; Chapman, W. R.; Seawell, W. ANGLING PRESSURE AND SPORT FISH HARVEST IN THE PREDATOR-STOCKING-EVALUATION RESERVOIRS. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 114-119. 1976[1978]. SFA 24(1)
[Tenn. Wildl. Resour. Agency, Nashville] Estimates of angling effort and sport fish harvest in 24 predator-stocking-evaluation reservoirs in 1972 and 1973 indicated mean annual angler-effort was 31.1 hours per acre and total harvest was 18.4 pounds per acre. Harvest-rate was 0.7 fish per hour or 0.6 pounds per hour. Average annual harvest of striped bass was 0.5 pounds per acre; walleye 0.3 pounds per acre. Striped bass harvest was positively related to dissolved solids content and water level fluctuation but negatively related to mean depth. Walleye harvest was positively related to mean depth and negatively to reservoir area. Establishment of significant fisheries for both striped bass and walleye in a single reservoir is improbable. No significant correlation was found between the harvests of stocked striped bass or walleye and the harvests of other sport fishes. Insofar as harvest data reflect production there is no evidence of competition between introduced and indigenous predators in the reservoirs sampled.

79-000705 Charbonneau, J. J.; Hay, M. J. DETERMINANTS AND ECONOMIC VALUES OF HUNTING AND FISHING. Trans. N. Am. Wildl. Nat. Resour. Conf. 43: 391-403. 1978. SFA 24(1)
[U.S. FWS, Washington, DC]

79-000706 Ditton, R. B.; Jarman, R. N.; Woods, S. A. AN ANALYSIS OF THE CHARTER BOAT FISHING INDUSTRY ON THE TEXAS GULF COAST. Mar. Fish. Rev. 40 (8): 1-7. Aug. 1978. SFA 24(1)
[Recreation Parks Dep., Tex. A&M Univ., College Station 77843] This paper examines the nature, extent, and characteristics of the Texas Gulf Coast charter boat fishing industry and its implications for fisheries management. Personal interviews were completed with 41 of the 88 Texas Gulf Coast charter operators in business during 1975. Data were obtained regarding charter operators: Characteristics, business structure, charter fishing activities, and economic returns. This study revealed that the Texas charter industry lacks a formal industry organization, is composed of small independent businesses which yield insufficient incomes to keep operators in business full time, involves operators who are primarily concerned with the life-style afforded by charter fishing, and is an integral part of the State's tourism industry.

79-000707 Ditton, R. B.; Mertens, T. J.; Schwartz, M. P. CHARACTERISTICS, PARTICIPATION, AND MOTIVATIONS OF TEXAS CHARTER BOAT FISHERMEN. Mar. Fish. Rev. 40 (8): 8-13. Aug. 1978. SFA 24(1)
[Recreation Parks Dep., Tex. A&M Univ., College Station 77843] The characteristics and motivation of Texas charter boat fishermen are identified in this paper. Profiles were compiled for the following: 1) The sociodemographic characteristics of place and residence, age, income, and occupation of charter fishermen; 2) their participation in charter fishing; 3) reasons for participating in charter fishing; and 4) opinions about their charter fishing experiences. This information is provided as a useful input to local and regional decision makers and also to clarify some of the issues involved in defining a "total" fishing experience. Thirteen motives, indicative of some of the reasons fishermen go charter fishing, were identified using factor analysis. Study findings indicate that fishermen consider many things important to a successful trip in addition to catching fish. Study findings are discussed, and implications and future research directions are suggested.

79-000708 Dunning, D. J.; Hadley, W. F. PARTICIPATION OF NONLICENSED ANGLERS IN RECREATIONAL FISHERIES, ERIE COUNTY, NEW YORK. Trans. Am. Fish. Soc. 107 (5): 678-681. Sept. 1978. SFA 24(1)
[Dep. Biol., SUNY Coll. Environ. Sci. For., Syracuse, NY 13210]

79-000709 Hammond, D. L.; Cupka, D. M. AN ECONOMIC AND BIOLOGICAL EVALUATION OF THE SOUTH CAROLINA PIER FISHERY. S.C. Mar. Resour. Cent. Tech. Rep. No. 20. iii + 14p. Nov. 1977. SFA 24(1)
[S.C. Wildl. Mar. Resour. Dep., P.O. Box 12559, Charleston 29412]

79-000710 Lenanton, R. C. J.; Hall, N. G. THE WESTERN AUSTRALIAN AMATEUR FISHERY FOR AUSTRALIAN HERRING (/ARRIPIS GEORGIANUS/): RESULTS OF THE 1973 CREEL CENSUS. Dep. Fish. Wildl. West. Aust. Rep. No. 25. 59p. 1976. SFA 24(1)
[Dep. Fish. Wildl., 108 Adelaide Terrace, Perth, Western Australia]

79-000711 Pinkas, L. CALIFORNIA MARINE FISH LANDINGS FOR 1975. Calif. Dep. Fish Game Fish Bull. 168. 55p. 1977. SFA 24(1)
[Calif. Dep. Fish Game, Sacramento]

79-000712 Schweitzer, D. L.; Cushwa, C. T.; Hoekstra, T. W. THE 1979 NATIONAL ASSESSMENT OF WILDLIFE AND FISH: A PROGRESS REPORT. Trans. N. Am. Wildl. Nat. Resour. Conf. 43: 266-273. 1978. SFA 24(1)
[U.S. For. Serv., USDA, Washington, DC]

79-000713 Smith, F. J. WHAT ARE SALMON WORTH? Oreg. State Univ. Ext. Mar. Adv. Prog. SG 48. 4p. July 1978. SFA 24(1)
[Oreg. State Univ., Corvallis]

REGULATIONS

79-000714 Fidell, E. R. DEVELOPMENTS IN THE LAW: THE FISHERY CONSERVATION AND MANAGEMENT ACT OF 1976. Oceans '78: Fourth Annu. Conf. Mar. Technol. Soc., Washington, DC and Inst. Elec. Electron. Eng., Inc., New York 4: 214-218. 1978. SFA 24(1)
[Le Boeuf, Lamb, Leiby & MacRae, 1757 N St., NW, Washington, DC 20036] The Fishery Conservation and Management Act of 1976 has now been in effect for over 1-1/2 years, and has been the subject of attention and action by the congress, the Executive Branch and the Federal Courts. A summary of the legal concerns that have arisen and that merit further attention is presented.

FISH CONTROL AND REMOVAL

79-000715 Seidensticker, E. P. COMMERCIAL GILL NETTING AND ITS EFFECTS ON SPORTFISHES IN TEXAS RESERVOIRS. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 203-206. 1976[1978]. SFA 24(1)
[Tex. Parks Wildl. Dep., Inland Fish. Res., Austin] This study was designed to compare the catch of sport and rough fishes and to determine the survival of sport fishes captured by commercial gill nets in Texas reservoirs. Commercial fishermen were required to submit monthly reports for 1 yr (April, 1973 through March, 1974) on their rough fish harvest and on the number and species of sport fishes caught and released. The catch was recorded from monthly samples of commercial harvest on Lakes Sam Rayburn, Whitney, Somerville and B. A. Steinhagen and from quarterly samples on Lakes Livingston and Cedar Creek. Netting mortality of sport fishes was determined by holding the fish for 17 days following their capture. Data indicated commercial fishermen did not report their catch accurately. Mortality studies showed largemouth bass and crappie suffered almost total netting mortality; catfishes exhibited better survival (63-100 percent). Losses were small and apparently not harmful to the sport fish populations. The continuation of commercial fishing was recommended on reservoirs having high populations of rough fishes and no striped bass.

79-000716 Stevenson, J. P. USE OF BIOLOGICAL TECHNIQUES FOR THE MANAGEMENT OF FISH. Victoria Fish. Wildl. Pap. No. 15. 14p. 8 Feb. 1978. SFA 24(1)
[Fish. Dis. Lab., Minist. Agric. Fish. Food, Weymouth, Dorset, England]

79-000717 Warnick, D. C. COMMERCIAL FISHING OR ROUGH FISH CONTROL IN SOUTH DAKOTA, SOME VIEWS AND APPARENT VALUES. S.D. Dep. Game Fish Parks Bull. No. 7. 22p. 1977. SFA 24(1)
[S. Dak. Dep. Game Fish Parks, Pierre]

MARKING AND TAGGING

79-000718 Konstantinov, K. G. MODERN METHODS OF FISH TAGGING. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 17 (6): 924-938. 1977. SFA 24(1)
[PINRO, Murmansk, USSR]

79-000719 Prince, E. D.; Maughan, O. E. ULTRASONIC TELEMETRY TECHNIQUE FOR MONITORING BLUEGILL MOVEMENT. Prog. Fish-Cult. 40 (3): 90-93. July 1978. SFA 24(1)
[U.S.FWS, 206 Highway 123 Bypass, Clemson, SC 29631]

79-000720 Tong, L. J. TAGGING SNAPPER /CHRYSOPHRYS AURATUS/ BY SCUBA DIVERS. N.Z. J. Mar. Freshwater Res. 12 (1): 73-76. 1978. SFA 24(1)
[Fish. Res. Div., Minist. Agric. Fish., P.O. Box 19-062, Wellington, New Zealand] A technique is described for the tagging of snapper underwater. Scuba divers release a detachable cod-end from a normal Granton trawl and tag the snapper at approximately the depth they are trawled. Using this technique, 697 snapper were tagged in the Hauraki Gulf in September 1975. Twenty-one (3.0 percent) were returned in the first year and by September 1977, 44 (6.3 percent) had been returned. The annual rate was only marginally higher than that from conventional programmes where the snapper were tagged at the surface (average value for Hauraki Gulf, 2.2 percent) and, because of the high cost and the fact that relatively few fish can be tagged by divers, the technique is not likely to be used again in shallow water tagging programmes. However, it will be a valuable technique for tagging snapper and other demersal fish species from deeper waters where decompression is a major cause of damage or death. The low return rate from snapper tagging programmes is thought to be mainly due to the low fishing pressure on the Hauraki Gulf stock.

STOCKING AND INTRODUCTIONS

79-000721 Jhingran, V. G.; Natarajan, A. V. RECOMMENDATIONS FOR STOCKING SILVER CARP IN GOVINDSAGAR (H.P.) AND NAGARJUNASAGAR (A.P.) TOGETHER WITH AN ACCOUNT OF THE SCOPE AND LIMITATIONS OF SILVER CARP STOCKING IN RIVERS AND RESERVOIRS IN INDIA. Cent. Inland Fish. Res. Inst. Barrackpore Bull. no. 28. 8p. Jan. 1978. SFA 24(1)
[CIFRI, Barrackpore, West Bengal, India]

79-000722 Martin, R. G. EXOTIC FISH PROBLEMS AND OPPORTUNITIES IN THE SOUTHEAST. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 15-17. 1976[1978]. SFA 24(1)
[Sport Fishing Inst., Washington, DC]

79-000723 Rieger, P. W.; Summerfelt, R. C. AN EVALUATION OF THE INTRODUCTION OF FLORIDA LARGEMOUTH BASS INTO AN OKLAHOMA RESERVOIR RECEIVING A HEATED EFFLUENT. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 48-57. 1976[1978]. SFA 24(1)

The purpose of this study was to observe growth, survival, and spatial distribution of the Florida largemouth bass (/Micropterus salmoides floridanus/) and of the northern subspecies (/M. s. salmoides/) in an Oklahoma reservoir thermally enriched by a heated effluent from an electrical generating plant. Hatchery-reared fingerlings of both subspecies were stocked in 1974 and 1975 after they were marked with either fluorescent pigments sprayed into the dermis, or, with magnetized metal injected into the nasal cartilage. Growth of the Florida subspecies was greater than that of the northern subspecies in both years of the study, but the difference was significant only in 1975. overwinter survival of Florida bass was lower than that of northern bass in both years, and was especially low (1.6 percent) during the winter of 1974-75, when lake temperatures were lower than during the winter of 1975-76. Spatial distribution of Florida bass during the winter of 1974-75 was largely limited to the vicinity of the thermal plume.

79-000724 Rutledge, W. P.; Lyons, B. W. TEXAS PEACOCK BASS AND NILE PERCH: STATUS REPORT. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies. 30: 18-23. 1976[1978]. SFA 24(1)

[Heart of the Hills Fish. Res. Stn., Texas Parks Wildl. Dep., Ingram 78025] Texas has 37 man-made reservoirs used to cool electro-power plants and several more are in the construction and/or planning phases. Managing the sport fishery in these reservoirs is difficult because temperate predators are unable to compete with overabundant rough fish populations characteristic in the warmed water of these impoundments. Nile perch (/Lates/ sp.) and peacock bass (/Cichla temensis/) are two tropical predators under investigation for possible introduction into power plant reservoirs. Small stocks of these fishes are being maintained in closed-recirculation systems at the Heart of the Hills Fisheries Research Station, Ingram, Texas. Fishes will be reared to sexual maturity, spawned, and the young used in temperature and salinity tolerance tests. Information gained in these tests will play a significant role in the selection of study reservoirs.

79-000725 Scott, D.; Hewitson, J.; Fraser, J. C. THE ORIGINS OF RAINBOW TROUT, /SALMO GAIRDNERI/ RICHARDSON, IN NEW ZEALAND. Calif. Fish Game 64 (3): 210-218. July 1978. SFA 24(1)

[Dep. Zool., Univ. Otago, Dunendin, New Zealand] The origins of the rainbow trout in New Zealand have long been the subject of controversy. The Baird Station on the McCloud River and the Russian River in California have been popularly named as principal sources. A search of records and literature in both New Zealand and America reveals rather conclusive evidence that the 1883 shipment of trout eggs to New Zealand originated from steelhead rainbow trout in Sonoma Creek, a tributary to San Francisco Bay. Progeny from this 1883 shipment were widely distributed throughout New Zealand, resulting in many self-sustaining populations. The Russian River as a source for these eggs is refuted. An earlier shipment of eggs in 1878 could well have been from cutthroat trout, the common native species of Lake Tahoe (California) from which the eggs were reportedly shipped. Other shipments in the late 1800's from the McCloud and Shasta rivers and in 1930 from Lake Almanor in California are discussed but are not considered to be as important as the 1883 shipment.

79-000726 Vila P., I.; Zeiss C., E.; Gibson, H. PROSPECCIONES DE SISTEMAS HIDROGRAFICOS PARA LA INTRODUCCION DEL "SALMON" EN CHILE. [PROSPECTS OF RIVER SYSTEMS FOR THE INTRODUCTION OF SALMON IN CHILE.] Biol. Pesq. 10: 61-73. June 1978. In Spanish with English summ. SFA 24(1)
[Fac. Cienc., Dep. Biol., Univ. Chile, Casilla 147, Santiago, Chile] River basins between Valdivia (39°45'S. 73°15'W.) and Puerto Montt 41°45'S. 42°45'W.) were seasonally surveyed with the purpose of selecting adequate introduction sites for /O. tshawytscha/ and /O. kisutch/. Main abiotic parameters such as: water flow, temperature, oxygen concentration, pH, alkalinity, total hardness and carbon dioxide, were obtained. Besides, number and identification of aquatic insects familia were obtained.

FISHING GEAR AND TECHNIQUES

79-000727 Barr, W. C.; McDonough, T. A. RECOVERY OF MARKED FISH IN COVE ROTENONE SAMPLES. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 230-233. 1976[1978]. SFA 24(1)
[TVA, Norris, TN 37828] The use of fin-clips and dart tags for determining recovery efficiency in summer cove rotenone samples was compared. Using a standardized cove methodology, fin-clipped fish were recovered from 69 coves at an overall rate (percent) of 52.4±4.7 (2S.E.), while in 21 coves 73.6±3.0 percent of the dart-tagged fish were recovered. As the sample season progressed recovery efficiencies for fin-clipped fish showed a consistent improvement, however, neither seasonal nor year-to-year means was as high as dart-tagged estimates. End of season values with both marking methods showed a recovery efficiency of about 70 percent in the reservoirs surveyed.

79-000728 Crandall, P. S.; Lyons, B. W.; Luebke, R. W. EVALUATION OF GILL NET AND ROTENONE SAMPLING TECHNIQUES WITH TOTAL RESERVOIR DRAWDOWN. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 222-229. 1976[1978]. SFA 24(1)
[Tex. Parks Wildl. Dep., Houston 77044] The effectiveness and selectivity of monofilament and multifilament gill netting and area rotenone sampling in a shallow, 15.3-ha impoundment were determined. Estimates of species present, relative abundance, length-frequency distributions and standing crops were determined by the sampling techniques and compared with total fish populations estimated by rotenone treatment of the entire impoundment. Each sampling device furnished close approximations of species present and relative abundance of dominant fishes, but gill netting was the most economical method of determining these two statistics. Area rotenone sampling provided the only adequate length-frequency data. Rotenoning surveys misrepresented the overall standing crop of fishes, but apparently furnished accurate standing crop estimates for sections of the impoundment sampled.

79-000729 Duncan, T. O. COLLECTION BUCKET FOR USE WITH TOW NETS FOR LARVAL FISH. Prog. Fish-Cult. 40 (3): 118-119. July 1978. SFA 24(1)
[U.S. FWS, Ouachita Baptist Univ., Arkadelphia, AR 71923]

79-000730 Duncan, T. O. NONMETALLIC ELECTROFISHING BOOMS AND ACCESSORY TACKLE. Prog. Fish-Cult. 40 (3): 98-100. July 1978. SFA 24(1)
[U.S. FWS, Ouachita Baptist Univ., Arkadelphia, AR 71923]

79-000731 Everest, F. H. DIVER-OPERATED DEVICE FOR IMMOBILIZING FISH WITH A SMALL EXPLOSIVE CHARGE. Prog. Fish-Cult. 40 (3): 121-122. July 1978. SFA 24(1)
[U.S. For. Serv., Pac. Northwest For. Range Exp. Stn., For. Sci. Lab., Corvallis, OR 97331]

79-000732 Goldstein, R. M. QUANTITATIVE COMPARISON OF SEINING AND UNDERWATER OBSERVATION FOR STREAM FISHERY SURVEYS. Prog. Fish-Cult. 40 (3): 108-111. July 1978. SFA 24(1)
[Div. Environ. Impact Stud., Argonne Natl. Lab., Argonne, IL 60439]

79-000733 Main, J.; Sangster, G. I. THE VALUE OF DIRECT OBSERVATION TECHNIQUES BY DIVERS IN FISHING GEAR RESEARCH. Scott. Fish Res. Rep. No. 12. 15p. 1978. SFA 24(1)
[Mar. Lab., Aberdeen, Scotland]

79-000734 Miura, T. [SYSTEMS ENGINEERING APPROACHES TO THE STUDIES OF FISHING GEAR--I. TRAP MODEL.] Bull. Jpn. Soc. Sci. Fish. 44 (8): 835-841. Aug. 1978. In Japanese with English summ. SFA 24(1)
[Fac. Fish., Hokkaido Univ., Hakodate, Japan]

79-000735 Olsen, D. A.; Dammann, A. E.; LaPlace, J. A. MESH SELECTIVITY OF WEST INDIAN FISH TRAPS. Mar. Fish. Rev. 40 (7): 15-16. July 1978. SFA 24(1)
[Island Resour. Found., P.O. Box 4187, St. Thomas, VI 00801]

79-000736 Rice, M. S.; Harmon, J. PROSPECTS FOR THE DEVELOPMENT OF A SWATH FISHING VESSEL. Oceans '78: Fourth Annu. Conf. Mar. Technol. Soc., Washington, DC and Inst. Elec. Electron. Eng., Inc., New York 4: 208-213. 1978. SFA 24(1)
[Adv. Design Staff, SEACO, Inc., Kailua, HI 96734] The modern fishing fleet has adopted multiple fishing techniques for survival. A single vessel is equipped to deep trawl, shallow trawl, long-line, and even set pots for lobster and crabs. In this way, today's fisherman is no longer restricted to the fortunes of the traditional one-technique fishing boat. Data are presented on the variable requirements for the Central Pacific industry and the type of vessel that is needed. The introduction into modern ship design of the Navy's SWATH (Small Waterplane Area Twin Hull) concept provides the industry with an advanced craft that has a wide expanse of usable deck and work spaces and extraordinary stability for safer, more effective deployment of equipment. The numerous features of the SWATH design are discussed, and a specific, though necessarily preliminary, design is presented for an advanced Semi-submerged Fishing Vessel (SSFV) that will be constructed in the early 1980's.

79-000737 Stewart, P. A. M. COMPARATIVE FISHING FOR FLATFISH USING A BEAM TRAWL FITTED WITH ELECTRIC TICKLERS. Scott. Fish. Res. Rep. No. 11. 10p. 1978. SFA 24(1)
[Mar. Lab., Aberdeen, Scotland]

79-000738 Strange, E. S. AN INTRODUCTION TO COMMERCIAL FISHING GEAR AND METHODS USED IN SCOTLAND. Scott. Fish. Inf. Pam. No. 1. 34p. 1977. SFA 24(1)
[Mar. Lab., Aberdeen, Scotland]

79-000739 Tanida, K. [ON THE RHEOLOGY OF NETTING TWINE--III RADIUS AND INSTANTANEOUS YOUNG'S MODULUS.] Bull. Jpn. Soc. Sci. Fish. 44 (7): 719-722. July 1978. In Japanese with English summ. SFA 24(1)
[Tokyo Univ. Fish., 5-7, Konan 4, Minato-ku, Tokyo 108, Japan]

79-000740 Yamane, T.; Sato, O. ON THE MOTION OF FISHING GEAR AGAINST WAVE ACTION--I. VERTICAL MOTION OF A FLOAT IN STILL WATER. Bull. Jpn. Soc. Sci. Fish. 44 (8): 843-849. Aug. 1978. SFA 24(1)
[Fac. Fish., Hokkaido Univ., Hokodate, Japan]

FERTILIZATION OF WATER AND SOIL

79-000741 Boyd, C. E.; Sowles, J. W. NITROGEN FERTILIZATION OF PONDS. Trans. Am. Fish. Soc. 107 (5): 737-741. Sept. 1978. SFA 24(1)
[Dep. Fish. Allied Aquacult., Auburn Univ. Agric. Exp. Stn., Auburn, AL 36830]

79-000742 Rappaport, U.; Sarig, S. THE RESULTS OF MANURING ON INTENSIVE GROWTH FISH FARMING AT THE GINOSAR STATION PONDS IN 1977. Bamidgeh 30 (2): 27-36. June 1978. SFA 24(1)
[Intensive Fish Cult. Stn., Fish. Dep., Ginosar, Israel] This year's experiments in the use of dry chicken droppings showed results identical to those of last year using the same manure but in liquid form. This is proof that dry chicken droppings may be used with absolute confidence and there is no need for the special and complicated manipulations involved in its liquification. This year as in the previous year, chicken droppings produced decidedly superior results to those of cattle manure. Supplementary addition of chicken droppings under conditions of intensive growth and at a density of 20,000 fish/ha increased the yield during the entire growth period by 21 percent and decreased the feed conversion rate by 0.4 units. Manuring had a pronounced effect during all 3 growth seasons and was decidedly advantageous during the second season which was the warmest. Once again, just as last year, the rise in temperature during the second season effected an increased growth rate. Chemical analyses of the pond bottom for nitrogen content, carbon and organic matter showed that there were no essential differences between the ponds manured with chicken droppings and the non-manured ponds. An economic analysis shows that the positive effect of manuring on yield level is accompanied by a decided increase in profitability.

79-000743 Schroeder, G. L. AUTOTROPHIC AND HETEROTROPHIC PRODUCTION OF MICROORGANISMS IN INTENSELY-MANURED FISH PONDS, AND RELATED FISH YIELDS. Aquaculture 14 (4): 303-325. Aug. 1978. SFA 24(1)
[Fish Aquacult. Res. Stn., Dor, Israel] Intensely-manured ponds produce 15-30 kg fish ha^{-1} day^{-1} with cow or chicken manure and nitrogen- and phosphate-rich fertilizers as the only nutritional inputs. The manure as it is supplied to the ponds is not a good fish food and does not produce good fish growth. Quantitative analysis shows that the production of all organisms, autotrophic and heterotrophic, pelagic and benthic, large enough to be used directly by the fish (i.e., larger than 37 microns) is adequate to account for less than half of the measured fish growth. Production within the microbial community that flourishes on and rapidly digests the manure organic matter is adequate to produce the measured fish growth. The fish appear to harvest the microorganisms at the level of bacteria and protozoa, by ingesting the small straw-like particles which comprise much of the manure and serve as the substrate for the microbial growth.

MATHEMATICS, STATISTICAL METHODS AND MODELING

79-000744 Armstrong, D. W.; Hislop, J. R. G.; Jermyn, A. S.; Newton, A. W. THE ESTIMATION OF MORTALITY RATES AND YEAR CLASS SIZE. Scott. Fish. Bull. 44: 7-11. 1978. SFA 24(1)
[Mar. Lab., P.O. Box 101, Victoria Rd., Torry, Aberdeen AB9 8DB, Scotland]

79-000745 Bloom, S. G.; Cornaby, B. W.; Martin, W. E. A GUIDE TO MATHEMATICAL MODELS USED IN STEAM ELECTRIC POWER PLANT ENVIRONMENTAL IMPACT ASSESSMENT. U.S. Fish Wildl. Serv. FWS/OBS-78/01. ix + 153p. Feb. 1978. Available at $3.25 from U.S.GPO, Washington, DC as No. 024-010-00459-2. SFA 24(1)
[Battelle Columbus Lab., 505 King Ave., Columbus, OH 43201]

79-000746 Capizzi, T.; Burton, D. T. A STATISTICAL TECHNIQUE FOR ANALYZING TIME-RESPONSE CURVES. Am. Soc. Test. Materials Spec. Tech. Publ. 652: 137-149. 1978. SFA 24(1)
[Div. Liminol. Ecol., Acad. Nat. Sci. Phila., Philadelphia, PA 19103] A statistical technique useful in the analysis of experiments involving time-response curves is presented. This procedure, known as growth curves analysis, uses the techniques of multivariate linear models to estimate parameters and test hypotheses. Examples of experimental designs to which this procedure can be applied and a worked out example are presented.

79-000747 Fletcher, R. I. ON THE RESTRUCTURING OF THE PELLA-TOMLINSON SYSTEM. NOAA Fish. Bull. 76 (3): 515-521. July 1978. SFA 24(1)
[Cent. Quantitative Sci. For. Fish. Wildl., Univ. Wash., Seattle 98195]

79-000748 Green, K. A. A CONCEPTUAL ECOLOGICAL MODEL FOR CHESAPEAKE BAY. U.S. Fish Wildl. Serv. FWS/OBS-78/69. v + 22p. Sept. 1978. SFA 24(1)
[11801 Rockville Pike, No. 802, Rockville, MD 20852]

79-000749 Hanson, J. A. AQUATIC ECOSYSTEM ANALYSIS & MODELING 1975. A SEA GRANT PERSPECTIVE. Oceanic Inst., Waimanalo, HI 75p. May 1976. SFA 24(1)
[Oceanic Inst., Waimanalo, HI 96795]

79-000750 MacCall, A. D. A NOTE ON PRODUCTION MODELING OF POPULATIONS WITH DISCONTINUOUS REPRODUCTION. Calif. Fish Game 64 (3): 225-227. July 1978. SFA 24(1)
[Calif. Dep. Fish Game, c/o SWFC, Box 271, La Jolla 92038]

79-000751 McNew, R. W.; Summerfelt, R. C. EVALUATION OF A MAXIMUM-LIKELIHOOD ESTIMATOR FOR ANALYSIS OF LENGTH-FREQUENCY DISTRIBUTIONS. Trans. Am. Fish. Soc. 107 (5): 730-736. Sept. 1978. SFA 24(1)
[Dep. Stat., Okla. State Univ., Stillwater 74074]

79-000752 Orth, D. J. COMPUTER SIMULATION MODELS FOR PREDICTING POPULATION TRENDS OF LARGEMOUTH BASS IN LARGE RESERVOIR. Proc. Okla. Acad. Sci. 58: 35-43. 1978. SFA 24(1)
[Okla. Coop. Fish. Res. Unit, Okla. State Univ., Stillwater] Two computer simulation models of population dynamics of largemouth bass (/Micropterus salmoides/) are described. Model I is an age-structured, deterministic model with numbers as the only state vector. Constant age-specific fecundities and survival rates are required inputs. Model I simulates population trends based on an equilibrium population. Sensitivity analysis of this model indicates that density of bass is most sensitive to variations in survival from egg to age I. Multiple regression equations with water level during spawning and water level fluctuation since the end of the previous growing season as predictor variables resolved 88.2 percent of the observed variation in year-class strength and 86.7 percent of the observed variation in mortality from egg to age I of largemouth bass in Lake Carl Blackwell. Model II is similar to Model I except that the effect of reservoir water level and water level fluctuation on survival of the young-of-the-year is included. Predictions of number of age I recruits from Model II agree closely with population estimates for Lake Carl Blackwell.

79-000753 Rivard, D.; Bledsoe, L. J. PARAMETER ESTIMATION FOR THE PELLA-TOMLINSON STOCK PRODUCTION MODEL UNDER NONEQUILIBRIUM CONDITIONS. NOAA Fish. Bull. 76 (3): 523-534. July 1978. SFA 24(1)
[Cent. Quantitative Sci. For. Fish. Wildl., Univ. Wash., Seattle 98195]

79-000754 Walters, C. J.; Hilborn, R.; Peterman, R. M.; Staley, M. J. MODEL FOR EXAMINING EARLY OCEAN LIMITATION OF PACIFIC SALMON PRODUCTION. J. Fish. Res. Board Can. 35 (10): 1303-1315. Oct. 1978. In English with French summ. SFA 24(1)
[Inst. Anim. Resour. Ecol., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada]

LAKE MANAGEMENT & RESEARCH

79-000755 Reich, K. LAKE KINNERET FISHING IN ITS DEVELOPMENT. Bamidgeh 30 (2): 37-64. June 1978. SFA 24(1)
[Hebrew Univ., Dep. Zool., Jerusalem, Israel]

79-000756 Todd, P. LAKE ELLESMERE - HOME FOR MOST NZ EELS. Riv. It. Piscic. Ittiop. 13 (3): 75-77. July-Aug.-Sept. 1978. In English and Italian. SFA 24(1)
[Fish. Res. Lab., Private Bag, Christchurch, New Zealand]

79-000757 Wilbur, R. L. TWO TYPES OF FISH ATTRACTORS COMPARED IN LAKE TOHOPEKALIGA, FLORIDA. Trans. Am. Fish. Soc. 107 (5): 689-695. Sept. 1978. SFA 24(1)
[Alaska Dep. Fish Game, Juneau 99801]

RIVER AND STREAM MANAGEMENT & RESEARCH

79-000758 Dewsnup, R. L.; Jensen, D. W.; Hoban, E.; Horak, G.; Lewis, M.; Nelson, W. PROMISING STRATEGIES FOR RESERVING INSTREAM FLOWS. U.S. Fish Wildl. Serv. FWS/OBS-77/29. xiv + 63p. Oct. 1977. Available from U.S. FWS, Western Energy and Land Use Team, 2625 Redwing Rd., Fort Collins, CO 80521. SFA 24(1)
[West. Nat. Resour. Found., Suite 9 Plaza Terrace, 445 E. Second South, Salt Lake City, UT 84111]

79-000759 Dewsnup, R. L.; Jensen, D. W. STATE LAWS AND INSTREAM FLOWS. U.S. Fish Wildl. Serv. FWS/OBS-77/27. vi + 72p. Mar. 1977. Available from U.S. FWS, Western Energy and Land Use Team, 2625 Redwing Rd., Fort Collins, CO 80521. SFA 24(1)
[West. Nat. Resour. Found., Suite 9 Plaza Terrace, 445 E. Second South, Salt Lake City, UT 84111] Relevant water laws concerning instream flow reservations for fish and wildlife are examined for the States of Washington, Oregon, California, Idaho, Nevada, Montana, Wyoming, Colorado, Arizona, New Mexico, North Dakota, Utah, and South Dakota. The report presents an overview of Western States' water law, identifies strategies available for reserving flows under existing laws, and presents in a matrix form the legal basis for each strategy on a state-by-state basis.

79-000760 Eiserman, F. MAINTAINING OUR FISHERIES. Wyo. Wildl. 42 (11): 38-41. Nov. 1978. SFA 24(1)
[Wyo. Game Fish Dep., Casper]

79-000761 Fatora, J. R. STREAM TROUT FISHERY MANAGEMENT IN THE SOUTHEASTERN UNITED STATES. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 280-284. 1976[1978]. SFA 24(1)
[Ga. Dep. Nat. Resour., Gainesville] Trout stream management consists of protection of existing waters from further degradation, and management of the fishery through regulation implementation and stocking programs to manipulate use patterns. The dwindling trout resource is impacted by an increasing number of resource users. Management of a trout fishery should consider attitudes of trout

79-000761 CONTINUED
fishermen expressed in their definitions of quality angling. An area-wide program should be managed to provide a variety of angling experiences. Regulations and stocking programs are essential management tools to manipulate use patterns to protect the resource and at the same time provide for the desires of trout fishermen.

79-000762 Fay, S. SALMON RECAPTURE CONNECTICUT. Nat. Hist. 87 (10): 38-45. Dec. 1978. SFA 24(1)

79-000763 Thurow, R. F.; Bjornn, T. C. RESPONSE OF CUTTHROAT TROUT POPULATIONS TO THE CESSATION OF FISHING IN ST. JOE RIVER TRIBUTARIES. Idaho For. Wildl. Range Exp. Stn. Bull. No. 25. iv + 35p. Feb. 1978. SFA 24(1)
[T. C. Bjornn: Idaho Coop. Fish. Res. Unit, Moscow] In 1973 the Idaho Fish and Game Commission closed four tributaries of the lower St. Joe River to Angling. To evaluate the effects of the closures on populations of westslope cutthroat trout (/Salmo clarki lewisi/) in tributaries and the St. Joe River, we assessed their species composition, abundance, and movements in the closed tributaries, in tributaries open to angling, and in tributaries with "trophy-fish" regulations, from 1973 to 1977. We also censused anglers on a tributary open to angling to assess angler effort, catch and opinions regarding the fishery. The closure to angling resulted in larger numbers of both large and small cutthroat trout in the closed tributaries. In the control streams the abundance of cutthroat trout did not increase significantly. Numerous cutthroat trout in tributaries had limited home ranges and remained in their natal stream. Tributaries also contained migratory cutthroat trout. Progeny of the migratory stock remained in tributary streams for 1 or 2 years before migrating in the spring into the St. Joe River or Coeur d'Alene Lake. The closure of tributaries to angling increased the abundance of trout in lower, accessible, sections of the tributaries. Since the migratory cutthroat trout we observed were present primarily in the lower sections of tributaries, the closure to angling probably increased the abundance of migratory fish which would eventually enter St. Joe River. The abundance of cutthroat trout also increased in upper, inaccessible, sections of the closed streams, but few migrated to the St. Joe River from these sections. A majority of the anglers would support restrictive regulations on tributary streams to improve the fishery in the main river.--From abstr.

79-000764 Wesche, T. MINIMUM STREAM FLOWS. Wyo. Wildl. 42 (11): 6-9, 25. Nov. 1978. SFA 24(1)
[Water Resour. Res. Inst., Univ. Wyo., Laramie]

FARM POND AND SMALL IMPOUNDMENT MANAGEMENT

79-000765 Dunseth, D. R.; Bayne, D. R. RECRUITMENT CONTROL AND PRODUCTION OF /TILAPIA AUREA/ (STEINDACHNER) WITH THE PREDATOR, /CICHLASOMA MANAGUENSE/ (GUNTHER). Aquaculture 14 (4): 383-390. Aug. 1978. SFA 24(1)
[Arab Contractors, Osman, Ahmed, Osman Co., 34 Adly Street, Cairo, Egypt]

79-000766 Ellison, D. G.; Heidinger, R. C. DYNAMICS OF HYBRID SUNFISH IN SOUTHERN ILLINOIS FARM PONDS. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 82-87. 1976[1978]. SFA 24(1)
[Dep. Zool., South. Ill. Univ., Carbondale 62901] Control of population density in southern Illinois farm ponds was achieved by stocking F(1) hybrid sunfish of the male bluegill (/Lepomis macrochirus/) X female green sunfish (/L. cyanellus/) and the male redear sunfish (/L. microlophus/) X female green sunfish with largemouth bass (/Micropterus salmoides/). Four of 30 ponds sampled were contaminated by nondesirable species from the watershed. Little or no recruitment of the F(2) generation occurred in ponds containing largemouth bass. In those populations where the hybrids were supplementally fed and bass were present, the F(1) bluegill X green sunfish hybrid averaged 159 g at annulus 3, and 199 g at annulus 4. In nonfed populations with bass this hybrid averaged 148 g at annulus 4. The F(1) redear sunfish X green sunfish hybrid averaged 127 g at annulus 4 in nonfed populations with bass. Multiple regression analysis revealed that the presence of largemouth bass and supplemental feeding had a high positive correlation (0.001 probability level) to growth of both F(1) hybrids. Pond owners considered the hybrid sunfish to be much more vulnerable to angling than the channel catfish (/Ictalurus punctatus/). Owners who stocked largemouth bass into their ponds were satisfied and would stock hybrid sunfish into another pond, although a majority of the owners without bass in their ponds were disappointed and would not stock hybrid sunfish into another pond.

79-000767 Rieger, P. W.; Summerfelt, R. C.; Gebhart, G. E. CATCHABILITY OF NORTHERN AND FLORIDA LARGEMOUTH BASS IN PONDS. Prog. Fish-Cult. 40 (3): 94-97. July 1978. SFA 24(1)
[U.S. Army Corps Eng., Waltham, MA 02154]

79-000768 Wyatt, G. W. THE EXPERIENCES OF THE TEXAS AGRICULTURAL EXTENSION SERVICE IN DEMONSTRATION STOCKING OF FARM PONDS FOR FISH PRODUCTION. In Proc. 1978 Fish Farm. Conf. and Annu. Conv. Catfish Farmers Tex. p. 5-9. 1978. SFA 24(1)
[Tex. Agric. Ext. Serv., College Station 77843]

LARGE IMPOUNDMENT MANAGEMENT & RESEARCH

79-000769 Aggus, L. R.; Lewis, S. A. ENVIRONMENTAL CONDITIONS AND STANDING CROPS OF FISHES IN PREDATOR-STOCKING-EVALUATION RESERVOIRS. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 131-140. 1976[1978]. SFA 24(1)
[U.S. FWS, Natl. Reservoir Res. Prog., Fayetteville, AR 72701] Relations between environmental variables and fish standing crops were examined in 1972-73 as part of a Predator-Stocking-Evaluation of reservoirs, sponsored by the Reservoir Committee, Southern Division of the American Fisheries Society. High volumes of flow and increased water exchange rates in 1973 were associated with increases in fish standing crops and changes in the size structure of fish assemblages in some study reservoirs. Reservoirs with higher inherent water exchange rates also supported larger standing crops than those with lower exchange rates. However, highly variable responses of fish populations in different reservoirs to environmental change reflect the importance of other physicochemical and biological interactions not measured in this analysis. Combinations of environmental variables explained from 41 to 67 percent of the variation in selected standing

79-000769 CONTINUED
crop components.

79-000770 Carver, D. C.; Hall, G. E.; Hall, J. F. HISTORY AND ORGANIZATION OF THE PREDATOR-STOCKING-EVALUATION BY THE RESERVOIR COMMITTEE, SOUTHERN DIVISION, AMERICAN FISHERIES SOCIETY. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 103-107. 1976[1978]. SFA 24(1)
[La. Wildl. Fish. Comm., Lake Charles] The Reservoir Committee, Southern Division, American Fisheries Society, undertook to measure the influence of stocked predator fishes on existing fish populations and sport fishing in selected reservoirs through a coordinated interagency study. Field data collected consisted of (1) fish population biomass estimation, (2) limnological survey, and (3) sport fish harvest estimation, with data being collected in 1972 and 1973. Twenty-six reservoirs, totaling 368,000 acres, were included in the project. The work plan used to standardize field data collection is described. Six years were required to plan, execute, analyze, and publish the results.

79-000771 Central Inland Fisheries Research Institute REPORT ON DAL LAKE, SRINAGAR, KASHMIR WITH SUGGESTIONS FOR DEVELOPMENT OF ITS FISHERY. Cent. Inland Fish. Res. Inst. Barrackpore Bull. no. 24. 13. 15 Jan. 1977. SFA 24(1)
[Barrackpore, West Bengal, India]

79-000772 Pritchard, D. L.; May, O. D., Jr.; Rider, L. STOCKING OF PREDATORS IN THE PREDATOR-STOCKING-EVALUATION RESERVOIRS. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 108-113. 1976[1978]. SFA 24(1)
[Tex. Parks Wildl. Dep., Austin] Sixteen of the 26 predator stocking evaluation (PSE) reservoirs were stocked with striped bass during 1967-71 and harvest of them by anglers was recorded in 10 reservoirs in 1972 and/or 1973. Walleye were stocked in nine of the PSE reservoirs and were harvested in six of them during the study period. Probable reasons for stocking success or failure are discussed in the accompanying PSE papers.

79-000773 Provine, W. C. COST/BENEFITS FROM THE ROTENONE RENOVATION OF A 485-HECTARE TEXAS RESERVOIR. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 216-221. 1976[1978]. SFA 24(1)
[Tex. Parks Wildl. Dep., Houston 77044] To determine the effects of a large-scale rotenone renovation on a fish community and sport fishery, a 5-yr study was conducted on Sheldon Reservoir, a 485-ha Texas reservoir with small sport fish populations and poor fishing. The lake level was lowered and the remaining water treated with liquid retenone. Gill nets, seines and a creel survey were used before and after treatment to evaluate this renovation. The relative abundance of sport fish populations increased from 17.54 percent (by weight) before treatment to a high of 46.27 percent after the renovation and restocking. Although high populations of sport fishes were maintained, turbid water conditions adversely affected fishing pressure and success, and prohibited accurate long-range evaluation of the effects of this treatment on the fishery. Comulative cost/benefit ratios for the first 3 yr after renovation were 1:1.63, 1:1.20 and 1:0.93 consecutively.

79-000774 Thomas, G. L. THE COMPARATIVE RESPONSES OF KOKANEE, LAKE WHITEFISH, AND YELLOW PERCH TO HYDROLOGICAL PERTURBATIONS IN BANKS LAKE, GRANT COUNTY, EASTERN WASHINGTON. Ph.D. dissertation, Univ. Wash. 186p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(5):2085. Nov. 1978. SFA 24(1)

79-000775 U.S. Fish and Wildlife Service RESERVOIR ECOSYSTEMS AND WESTERN COAL DEVELOPMENT IN THE UPPER MISSOURI RIVER BASIN. A SUMMARY REPORT. U.S. Fish Wildl. Serv. FWS/OBS-78/25. 13p. 1978. SFA 24(1)
[2625 Redwing Rd., Fort Collins, CO 80526]

79-000776 Weithman, A. S.; Anderson, R. O. ANGLING VULNERABILITY OF ESOCIDAE. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies 30: 99-102. 1976[1978]. SFA 24(1)
[Mo. Coop. Fish. Res. Unit, Univ. Mo., Columbia 65201] Five yearling northern pike (/Esox lucius/), muskellunge (/Esox masquinongy/), or their F(1) hybrid ("tiger muskie") were stocked in duplicate 0.2-ha ponds in April, 1974. Two additional ponds were stocked with a combination of five fish of each of the three forms. In 58 hours of angling from April to September, northern pike were 3.1 and 4.2 times more vulnerable than tiger muskies and muskellunge, respectively. No fish were caught in 18 hours of fishing from 15 June to 13 August. Repeat catches accounted for 35.6 percent of the total catch; hooking mortality was negligible (1.7 percent).

ESTUARY MANAGEMENT & RESEARCH

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[U.S. FWS, NSTL Station, MS 39529]

MARINE MANAGEMENT & RESEARCH

79-000778 Armstrong, D. W. MANAGEMENT OF FISH STOCKS. Scott. Fish. Bull. 44: 4-7. 1978. SFA 24(1)
[Mar. Lab., P.O. Box 101, Victoria Rd., Torry, Aberdeen AB9 8DB, Scotland]

79-000779 Armstrong, D. W.; Hislop, J. R. G. THE NORTH SEA FISHERIES FOR COD, HADDOCK AND WHITING IN RECENT YEARS. Scott. Fish. Bull. 44: 12-14. 1978. SFA 24(1)
[Mar. Lab., P.O. Box 101, Victoria Rd., Torry Aberdeen AB9 8DB, Scotland]

79-000780 Bailey, R. S. THE NORTH SEA SPRAT STOCK. Scott. Fish. Bull. 44: 20-25. 1978. SFA 24(1)
[Mar. Lab., P.O. Box 101, Victoria Rd., Torry, Aberdeen AB9 8DB, Scotland]

79-000781 Baxter, I. G. THE NORTH SEA HERRING. Scott. Fish. Bull. 44: 14-16. 1978. SFA 24(1)
[Mar. Lab., P.O. Box 101, Victoria Rd., Torry, Aberdeen AB9 8DB, Scotland]

79-000782 Chan, M.-L.; Buchanan, J. E.; Garling, W.; Sasser, J., Jr. OPTIMAL MANAGEMENT OF GLOBAL TUNA RESOURCES. Oceans '78: Fourth Annu. Conf. Mar. Technol. Soc., Washington, DC and Inst. Elec. Electron. Eng., Inc., New York 4: 199-203. 1978. SFA 24(1)
[Systems Control, Inc., 1801 Page Mill Rd., Palo Alto, CA 94304]

79-000783 Coastal Plains Center for Marine Development Services REPORT OF THE CONFERENCE ON MARINE RESOURCES OF THE COASTAL PLAINS STATES. Coast. Plains Cent. Mar. Dev. Serv., Wilmington, N.C. v + 90p. 1977. SFA 24(1)
[1518 Harbour Dr., Wilmington, NC 28401]

79-000784 Coastal Plains Center for Marine Development Services SUMMARY OF MARINE ACTIVITIES OF THE COASTAL PLAINS REGION. Coast. Plains Cent. Mar. Dev. Serv., Wilmington, N.C. v + 108p. Oct. 1978. SFA 24(1)
[1518 Harbour Dr., Wilmington, NC 28401]

79-000785 Cupka, D. M.; Eldridge, P. J.; Huntsman, G. R. , (eds.) PROCEEDINGS OF WORKSHOP ON THE SNAPPER/GROUPER RESOURCES OF THE SOUTH ATLANTIC BIGHT. S.C. Mar. Resour. Cent. Tech. Rep. No. 279. ii + 46p. Nov. 1977. SFA 24(1)
[S.C. Wildl. Mar. Resour. Dep., Charleston] A collection of papers.--RS.

79-000786 Everson, I. THE LIVING RESOURCES OF THE SOUTHERN OCEAN. FAO of the UN South. Ocean Fish. Serv. Prog. GLO/SO/77/1. iv + 156p. Sept. 1977. SFA 24(1)
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79-000787 FAO of the UN MECHANICS OF TUNA RESEARCH AND MANAGEMENT. REPORT OF THE SECOND SESSION OF THE INDIAN OCEAN FISHERY COMMISSION AD HOC COMMITTEE ON NATIONS. FAO Fish. Rep. No. 184. v + 8p. 1976. SFA 24(1)
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79-000788 Marine Technology Society; Institute of Electrical and Electronics Engineers OCEANS '77 CONFERENCE RECORD (2 VOL.). 1977. Available from IEEE, 445 Hoes Lane, Piscataway, NJ 08854 or MTS, 1730 M Street NW, Washington, DC 20036. SFA 24(1)
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79-000789 Morrison, J. THE MINCH HERRING. Scott. Fish. Bull. 44: 16-19. 1978. SFA 24(1)
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[Mar. Lab., P.O. Box 101, Victoria Rd., Torry, Aberdeen AB9 8DB, Scotland]

79-000793 Rockland, S. THE SAN DIEGO TUNA INDUSTRY AND ITS EMPLOYMENT IMPACT ON THE LOCAL ECONOMY. Mar. Fish. Rev. 40 (7): 5-11. July 1978. SFA 24(1)
[Dep. Econ., San Diego State Univ., San Diego, CA 92182]

UTILIZATION OF FISHERY PRODUCTS

79-000794 Biediger, C. IS /SALMONELLA/ A PROBLEM IN CATFISH? In Proc. 1978 Fish Farm. Conf. and Annu. Conv. Catfish Farmers Tex. p. 62-65. 1978. SFA 24(1)
[Tex. Agric. Exp. Stn., College Station 77843]

79-000795 Crawford, K. W.; Dunseth, D. R.; Engle, C. R.; Hopkins, M. L.; McCoy, E. W.; Smitherman, R. O. MARKETING TILAPIA AND CHINESE CARPS. In R. O. Smitherman, W. L. Shelton, and J. H. Grover, eds. Culture of Exotic Fishes Symposium Proceedings. Fish Cult. Sect., Am. Fish. Soc., Auburn, Ala. p. 240-257. 1978. Proceedings available at $5.00 from Fish Cult. Sect., Am. Fish. Soc., c/o Dep. Fish Allied Aquacult., Auburn Univ., Auburn, AL 36830. SFA 24(1)
[Farm Fresh Catfish Co., P.O. Box 188, Greensboro, AL 36744] Three market tests were conducted in the East-Central Alabama area in 1976 and 1977 using tilapia (/Tilapia aurea/; /T. nilotica/ and /T. nilotica/ x /T. hornorum/ hybrids), silver carp (/Hypophthalmichthys molitrix/), and bighead carp (/Aristichthys nobilis/). The primary objective was to determine consumer acceptance of these exotic species that were grown in polyculture experiments at the Auburn University Agricultural Experiment Station Fisheries Research Unit. The initial study tested the marketability of tilapia and silver carp in retail supermarkets. Marketing procedures and pricing are described. The results of mail-in consumer response questionnaires are presented. The second market test was conducted using bighead carp to analyze the feasibility of utilizing alternative market outlets: wholesalers, individuals, and supermarkets, and to determine consumer acceptability of large fish (3.6 kg liveweight). Marketing practices used by different market outlets are discussed. The third study involving only tilapia was to determine consumer acceptance of these species in market outlets where marketing functions would be minimal and to

79-000795 CONTINUED
attempt to saturate all market outlets. A consumer response survey of tilapia buyers was conducted by telephone and the results are summarized.

79-000796 Mikeska, M. FISH FOR RESTAURANTS AND CATERERS. In Proc. 1978 Fish Farm. Conf. and Annu. Conv. Catfish Farmers Tex. p. 66-70. 1978. SFA 24(1)
[Rudy Mikeska Barbeque and Catering Serv., Taylor, TX 76574]

MISC. TECHNIQUES AND EQUIPMENT

79-000797 Holliday, D. V.; Smith, P. E. SEASONAL CHANGES IN FISH SIZE DISTRIBUTIONS AS DETECTED BY ACOUSTIC RESONANCE SURVEY AND BY CONVENTIONAL SAMPLING. J. Acoust. Soc. Am. 64 (suppl.1): 95. 1978. Abstract only. SFA 24(1)
[Tracor, Inc., San Diego, CA 92110] The larvae, juveniles, and adults of the northern anchovy inhabiting the Southern California Bight were monitored by conventional direct sampling, by the commercial fishery, by trawl sampling, and by plankton net sampling during 1977. Broadband acoustic techniques were used to further characterize sonar targets in terms of the presence or absence of gas-filled swimbladders. For targets whose spectra exhibited resonance structure, distributions of swimbladder sizes were calculated for individual schools, school groups, and for ensembles of school groups. Observed seasonal changes in swimbladder size distributions implicate fish growth, mortality, and behavior as parameters impacting the frequency dependence of the acoustic backscattering from schools. A comprehensive list of species known to frequent this ocean area will be discussed in this context. An overview of the distribution and biophysical characteristics of the common pelagic nekton which inhabit the Southern California Bight will provide the background for a description of the distribution of schools and aggregations as determined acoustically in March, May, and September of 1977.

79-000798 Information Systems Technical Laboratory MAP INDEXING SYTEMS USER'S MANUAL. U.S. Fish Wildl. Serv. FWS/OBS-78/64. v + 23p. Mar. 1978. SFA 24(1)
[Fed. Rocky Mtn. States, Inc. 1 Drake Park, Suite 142, 33 W. Drake Rd., Fort Collins, CO 80526]

79-000799 Kanemori, R. Y.; Ehrenberg, J. E. A MICROCOMPUTER-BASED ECHO-INTEGRATION SYSTEM FOR FISH POPULATION ASSESSMENT. Ocean '78: Fourth Annu. Conf. Mar. Technol. Soc., Washington, DC and Inst. Elec. Electron. Eng., Inc., New York 4: 204-207. 1978. SFA 24(1)
[Appl. Phys. Lab., Univ. Wash., Seattle 98105] Abundance estimates obtained with acoustic echo-sounding equipment play an important role in the management of fish stocks. The common technique presently used is to process the signal from the echo sounder with a digital computer or to record the analog signal for later processing. A microcomputer-based echo-integration system has been developed for fish population assessment. It is a relatively inexpensive, field-oriented, portable instrument that can process data in real time from any existing echo sounder. The signal from the echo sounder is detected, digitized, squared, and averaged for various depth ranges. The averaged squared echo level is then scaled to provide a measure of the density of the fish school at the selected depth ranges. The system automatically tracks the bottom depth and prevents intergration of the return from

79-000799 CONTINUED
the bottom.

79-000800 Love, R. H. A MODEL FOR ESTIMATING DISTRIBUTIONS OF FISH SCHOOL TARGET STRENGTHS. J. Acoust. Soc. Am. 64 (suppl.1): 96. 1978. Abstract only. SFA 24(1)

[Naval Ocean Res. Dev. Activity, NSTL Stn., MS 39529] A model has been developed to estimate the distribution of fish school target strengths for any schooling species. The model has both biological and acoustic components. The biological component estimates distributions of school size and density for a given species. A discrete spectrum of nondimensionalized school densitities, developed by combining and synthesizing the results of experimental studies on intraschool spacing, is utilized to estimate school density distributions. Discrete spectra of school sizes based on empirical knowledge and assumptions of school growth and reduction are utilized to estimate school size distributions. The acoustic component combines estimates of target strengths of individual fish with numbers of fish insonified to calculate school target strengths at any aspect for a school of given size and density. Multiple scattering is neglected, but attenuation through the school is accounted for by the use of shadowing factors. Provision is made for schools which are not totally insonified due to limitations of sonar beamwidth or pulse length. Comparison to available experimental data indicates that the model produces a reasonable estimate of target strength distributions.

79-000801 Maniwa, Y.; Furusawa, M. HYDROACOUSTIC SYSTEM FOR FISH COUNTING. J. Acoust. Soc. Am. 64 (suppl.1): 95. 1978. Abstract only. SFA 24(1)

[For. Eng., Kagoshima Univ., 21-40 Kohrimoto 1, Kagoshima, 890 Japan] The hydroacoustic system to count the numbers of sea fish with precision have been studied. Experiments have been performed on fish cultivated in culturing nets, numbers of which have been counted manually. In this system, the volume of fish school and their distribution density are separately measured by applying the principles of the fish finder and then the number of fish are determined by multiplying one by another. The approximate volume is determined by the shape of section of fish school which is displayed by using the principle of PPI sonar. The ultrasonic waves reflected from fish in the effective volume are compounded. Accordingly, the number of fish in the effective volume is obtained from the intensities of the reflected waves. The distribution density is calculated by dividing the number by the effective volume. In the case of good distribution of fish, the error is within ±5 percent. It is expected that such a system will be extended to the measurement of fish stocks.

79-000802 Penrose, J. D.; Kaye, G. T. COMPARISON OF TARGET STRENGTHS OF MARINE ORGANISMS. J. Acoust. Soc. Am. 64 (suppl.1): 96. 1978. Abstract only. SFA 24(1)

[West. Aust. Inst. Technol., South Bentley, Western Australia 6102] An empirical relationship which links fish length, target aspect, and target strength for geometric region scattering has been developed. When peak target strengths of squid, crabs, and penaeid prawns at dorsal aspect are compared with this relationship, it can be noted that the target strengths for nonfish lie within 6dB below Love's prediction for fish of similar size. Some zooplankton values are within similar limits if the insonifying frequencies are sufficiently high to ensure that geometric region interactions occur. The target strength data reviewed show little overall frequency dependence, in contrast to what would be expected if the scatterers were modeled as

79-000802 CONTINUED
finite cylinders.

79-000803 Thorne, R. E. INVESTIGATIONS INTO THE ACCURACY AND PRECISION OF HYDROACOUSTIC TECHNIQUES FOR FISHERY RESOURCE ASSESSMENT. J. Acoust. Soc. Am. 64 (suppl. 1): 96. 1978. Abstract only. SFA 24(1)

[Coll. Fish., Univ. Wash., Seattle 98195] Hydroacoustic techniques are becoming widely used in fishery resource assessment. There are many sources of variability and uncertainty in these techniques, and their accuracy and precision has been questioned. Studies at the University of Washington have evaluated the performance of hydroacoustic techniques in a variety of applications where substantial ground truth data were available. These studies have documented the magnitude of several variance components and shown that many of the larger sources of variability are biological rather than physical.

79-000804 Traynor, J. J.; Ehrenberg, J. E. IN SITU TARGET STRENGTH MEASUREMENT FOR ACOUSTIC FISH STOCK ASSESSMENT. J. Acoust. Soc. Am. 64 (suppl.1): 95. 1978. Abstract only. SFA 24(1)

[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112] In an acoustic fisheries assessment survey, the target strength distribution of the fish being surveyed is an important parameter, primarily as a factor to scale the output of an echo integration system to fish density; however, good techniques to evaluate target strength of the surveyed fish are not readily available. Results of target strength measurements using tethered or caged fish are available but, because little is known about the orientation and aspect of the surveyed fish population, the scaling of echo integration to fish density using these results is questionable. In situ estimation techniques are the most promising alternative. Indirect in situ methods which statistically convert echo strength distributions to target strength distributions are available but often provide poor results. A dual beam method utilizes a dual beam transducer system and corrects echo strength to target strength for each detected single fish target. Unlike the indirect techniques, the dual beam method allows the effect of an inherent bias caused by a system noise induced threshold to be reduced. Field results using a standard target (ping-pong ball) and fish targets are reported and comparisons with theoretical predictions are made.

79-000805 Vent, R. J. FISH SCHOOL TARGET STRENGTH MEASUREMENTS OFF SOUTHERN CALIFORNIA. J. Acoust. Soc. Am. 64 (suppl.1): 96. 1978. Abstract only. SFA 24(1)

[Naval Oceans Systems Cent., San Diego, CA 92152] Measurements of target strength were made of pelagic fish schools in the Los Angeles Bight where the dominant schooling species is the northern anchovy, /Engraulis mordax/. Data were collected using a hull-mounted, side-looking 30-kHz sonar system. Among the parameters studied were peak target strength, integrated target strength, target extent, and variation of peak target strength with aspect. Three schools were interrogated, while the vessel was hove to, with varying pulse durations: 2, 10, 50, and 170 ms. Results indicate that peak target strength varies directly with the pulse duration when the pulse length is less than the target extent, whereas integrated target strength appears to be independent of pulse duration. School peak target strength and target extent, for 10-ms pulse duration, were measured while the vessel circled a school through 360°. Variations in target strength of 20 dB and in target extent of 30 m were observed. The minimum target strength corresponded with the maximum target extent,

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which may possibly be explained by the school's geometry and variations of individual fish target strength with yaw aspect.

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79-000808 Ecology Consultants, inc.; Dames and Moore, Consulting Engineers ANNOTATED BIBLIOGRAPHY OF NATURAL RESOURCE INFORMATION: NORTHWESTERN NEW MEXICO. U.S. Fish Wildl. Serv. FWS/OBS-77/33. vi + 141p. Sept. 1977. SFA 24(1)
[P.O. Box 2105, Fort Collins, CO 80522]

79-000809 FAO of the UN WORLD LIST OF AQUATIC SCIENCES AND FISHERIES SERIAL TITLES. FAO Fish. Tech. Pap. No. 147 Suppl. 3. x + 148p. July 1978. SFA 24(1)
[Rome, Italy]

79-000810 Marshall, K. E. A BIBLIOGRAPHY OF THE LAKE TROUT, /SALVELINUS NAMAYCUSH/ (WALBAUM), 1970-77. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 799. iv + 11p. Aug. 1978. In English with French summ. SFA 24(1)
[Fish Mar. Serv., Freshwater Inst., Winnipeg, MB R3T 2N6, Canada]

79-000811 New Zealand Ministry of Agriculture and Fisheries FISHERIES RESEARCH PUBLICATIONS 1927-78. N.Z. Minist. Agric. Fish. Fish. Res. Div. Occas. Publ. No. 1. 31p. 1978. SFA 24(1)
[Wellington, New Zealand]

79-000812 Nicholson, H. F. BIBLIOGRAPHY ON THE LIMNOLOGY AND FISHERIES OF CANADIAN FRESHWATERS. NO. 5. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 804. 1978. SFA 24(1)
[Canada Cent. Inland Waters, 867 Lakeshore Rd., Burlington, ON L7R 4A6, Canada]

79-000813 Waterman, J. J. KEY TO ADVISORY NOTES 1-59. Torry Res. Stn. Advis. Note No. 60. 22p. 1973. SFA 24(1)
[Torry Res. Stn., P.O. Box 31, Aberdeen AB9 8DG, Scotland]

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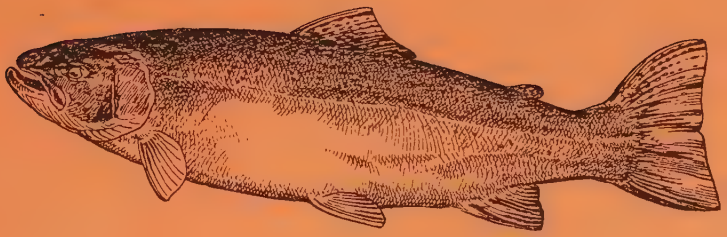

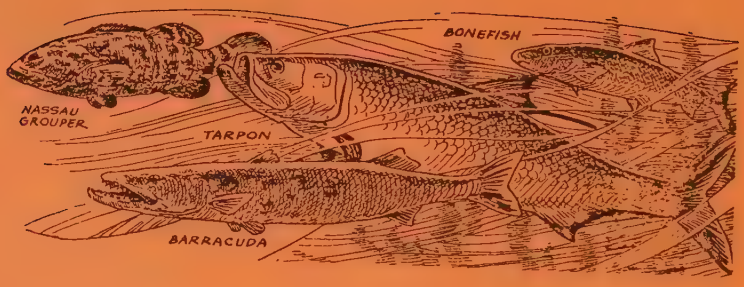
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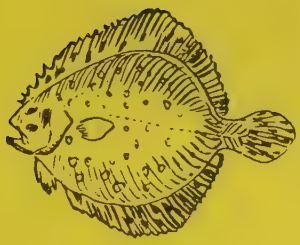

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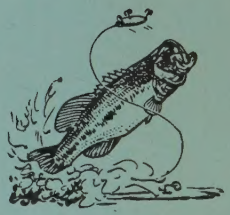

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